



Regional Rail Plan for the San Francisco Bay Area

Revised Draft Report
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EXECUTIVE SUMMARY

ES.1 INTRODUCTION

The Metropolitan Transportation Commission, the Peninsula Corridor Joint Powers Board (Caltrain), the Bay Area Rapid Transit District (BART), and the California High-Speed Rail Authority (CHSRA) joined efforts over the past two years to develop a long-range vision for improving the passenger rail system we have in place and expanding its reaches to serve future Bay Area travel demand. It has been a half-century since the last comprehensive look at the San Francisco Bay Area's rail system. When Bay Area voters approved Regional Measure 2 in 2004, the measure specified and provided funding for the preparation of a comprehensive master plan for Bay Area rail.

The purpose of creating the Regional Rail Plan is threefold:

- To comprehensively identify a vision for a robust, interconnected system of Bay Area passenger rail improvements and expansions to guide investment decisions;
- To create a safe, fast, reliable, and integrated passenger and freight rail network that addresses the tremendous growth anticipated in transportation demand; and
- To sustain and enhance the economic vitality of Northern California, while minimizing the impact on the environment, by providing excellent transit service that strengthens existing downtowns and economic centers.

Why Rail Is Important to the Bay Area

- **A Growing Region**

By 2050, the region's population is anticipated to grow by over 40 percent for a total of 10 million people. This population growth will place tremendous pressure on the existing transportation network.

- **In-Commuting from Neighboring Sacramento and San Joaquin Valleys**

The greatest increase in travel growth into the Bay Area over the next few decades is anticipated to come from our Sacramento and Central Valley neighbors. Without stronger transit systems leading to the main Central Valley cities and connecting them to each other, there will be fewer opportunities for the cities to plan for the kind of compact development that the Bay Area is moving towards.

- **International Trade and Regional Freight Movement**

A freight traffic demand is expected to grow in excess of 350 percent over the next 50 years. Expanded and improved rail infrastructure will be needed to support the demands of freight and passenger growth to mitigate the explosive growth of truck traffic on our roads.

- **High Levels of Traffic Congestion**

Bay Area polls often find persistent traffic congestion as the primary concern for our residents. As the volume of traffic exceeds a road's capacity, the speed of traffic decreases exponentially rather than gradually.

Consequences of Not Addressing Bay Area Rail Needs

- **High Cost to Our Economy**

The adverse economic impacts of congestion and inadequate transit access are already becoming apparent. Congestion would have been about 50 percent worse if not for the region's public transit system, according to the Texas Transportation Institute's 2005 Mobility Study Performance Measure Summary.

- **High Cost to Our Environment**

Without an expanded rail system, the natural environment may also suffer. Promoting development in walkable communities near transit is our best hope for taking development pressure off open space and farms.

- **High Energy Consumption and Greenhouse Gas Emissions**

A fast growing environmental concern is global climate change, and the transportation sector is responsible for 40 percent of California's greenhouse gas emissions, and up to 50 percent in the Bay Area. Offering real transportation choices will be critical for cutting greenhouse gas emissions.

Regional Rail Vision

- **Ring the Bay with Rail**

A long-term vision of many in the region is to ring the Bay, connecting the three major Bay Area cities (San Francisco, Oakland, and San Jose), with a fast, frequent and integrated passenger rail network.

- **The Right Technology Should Be Used With the Right Corridor**

A broad range of rail technologies, including BART and conventional passenger trains like Amtrak are considered in this plan. Emerging technologies such as non-Federal Railroad Administration compliant Electric Multiple Unit (EMU) trains are also explored.

- **The BART & Caltrain Systems Are the Backbone**

The BART and Caltrain systems serve as the backbone of the regional rail network and it is clear there will be capacity constraints and renovation needs for the existing systems. This reinvestment should be a top regional priority over the next few decades.

- **The BART System's Outward Expansion Is Nearly Complete**

While BART will always remain at the core of the region's rail system; its outward expansion potential is limited. Once the extension to San Jose is completed, and the existing lines are brought to logical terminals in Livermore, Santa Clara and East Contra Costa County, no additional outward extensions of the BART technology are contemplated. Higher-speed express trains would better serve outlying

suburban markets. Instead, BART will evolve toward a higher-frequency, highly productive metro system.

- **The Bay Area Needs a Regional Rail Network**

As the BART system becomes more of a high-frequency, close stop spacing urban subway system, it needs to be complemented with a larger regional express network serving longer-distance trips. These trains would run largely on existing tracks, some shared with freight and others in their own rights-of-way with specialized signaling and dispatch systems.

- **Rail Infrastructure Must Be Expanded to Accommodate Growth In Passenger and Freight Traffic**

To allow the region's economy to continue growing while meeting increased passenger needs, the freight and passenger rail systems must be increasingly accommodated. Certain freight corridors require additional mainline tracks to support high-frequency freight and passenger services.

- **High-Speed Rail Provides Opportunities to Enhance and Accelerate Regional Rail Improvements**

High-Speed Rail complements and supports the development of regional rail – a statewide high-speed train network would enable the operation of fast, frequent regional services along the high-speed lines and should provide additional and accelerated funding where high-speed and regional lines are present in the same corridor.

- **Rail Transit and Focused Transit-Oriented Developments Must Go Hand in Hand:** If the region is to make a substantial investment in rail infrastructure, land development surrounding the stations/stops and along the rail corridor must be fully integrated with rail services and they must be supportive of one another. Regional and local policies and programs that support focused land-uses must be in place to make this happen.
- **Institute a New Governance Structure for Delivery of Rail Services:** Delivering high-quality, efficient rail services will require institutional changes from the multiple transit operators and multiple providers of regional rail that are in place today. The region must set a course of action to initiate and implement the necessary institutional changes.
- **Successor to Resolution 3434 Needed to Advocate for Rail Funding:** Having a consensus agreement in place will help the region articulate a shared vision about rail expansions that includes Resolution 3434; define improvements that go beyond Resolution 3434 that should be considered in subsequent RTP updates; and provide a strong advocacy platform to aggressively compete for scarce public/private, regional, state and federal funds.

ES.2 STUDY PROCESS

Recognizing that Resolution 3434 represents MTC's regional rail investment over the next 25 years as adopted first in the 2001 Regional Transportation Plan and reaffirmed in the subsequent plan update, Resolution 3434 is included as part of the “base case” network (see ES-1). Therefore, the study effort focused on defining options for rail improvements and expansions beyond Resolution 3434.

Resolution 3434 rail projects include:

1. BART/East Contra Costa Rail (eBART)
2. ACE/Increased Services
3. BART/I-580 Rail Right-of-Way Preservation
4. Dumbarton Bridge Rail Service
5. BART/Fremont-Warm Springs to San Jose Extension
6. Caltrain/Rapid Rail/Electrification & Extension to Downtown San Francisco/Transbay Transit Center
7. Caltrain/Express Service
8. SMART (Sonoma-Marin Rail)
9. Capitol Corridor/Increased Services
10. BART/Oakland Airport Connector

Figure ES-1

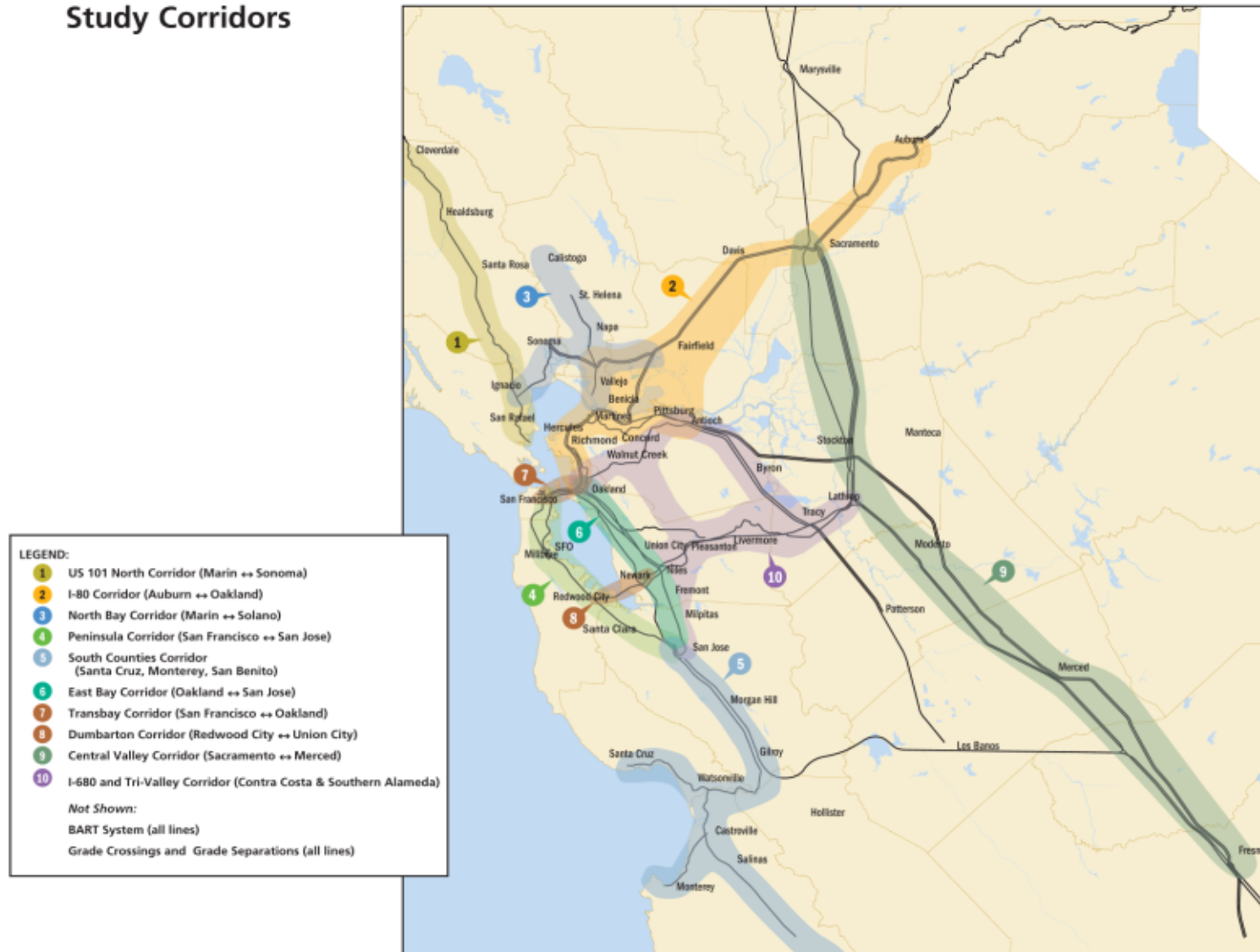


The study area was divided up into the corridors shown in Figure ES-2, which were defined as areas connecting between major population centers where a substantial portion of the trunk travel is along the defined route. The corridors are geographically distinct, but they may overlap at major regional centers, where some rail infrastructure may be shared. The twelve corridors are:

- BART System (all lines)
- US 101 North Corridor (Marin ↔ Sonoma)
- North Bay Corridor (Marin ↔ Solano)
- I-80 Corridor (Auburn ↔ Oakland)
- East Bay Corridor (Oakland ↔ San Jose)
- Transbay Corridor (San Francisco ↔ Oakland)
- Peninsula Corridor (San Francisco ↔ San Jose)
- South Counties Corridor (Santa Cruz, Monterey, San Benito)
- Dumbarton Corridor (Redwood City ↔ Union City)
- I-680 & Tri-Valley Corridor (Contra Costa & Southern Alameda)
- Central Valley Corridor (Sacramento ↔ Merced)
- Grade Crossings and Grade Separations (all lines)

Figure ES-2

Study Corridors



Study Alternatives

Twelve study alternatives were initially identified for Regional Rail with and without High-Speed Rail. With additional stakeholder and Steering Committee input, the alternatives were winnowed to the following:

- **Existing:** Includes existing Capitol Corridor, Amtrak San Joaquin, Altamont Commuter Express (ACE) and Caltrain standard passenger rail, along with BART services.
- **Baseline – Year 2030:** Encompasses MTC's Regional Transit Expansion Program (Resolution No. 3434), including nine new rail extensions and significant service expansions to existing rail lines; introduces Sonoma-Marín Rail Transit Project (SMART), Dumbarton, and eBART, as well as enhancements to the Capitol Corridor, Amtrak San Joaquin, ACE and Caltrain. It also includes BART “Core Capacity” improvements.
- **Alternative 1 – Year 2050 – Regional Rail with BART**
Systemwide Expansion Focus: No high-speed rail; standard passenger rail shared with freight (capacity improvements as needed); freight dispatching optimized on shared lines; separate freight and passenger tracks on high capacity corridors; short-haul freight between Port of Oakland and Central Valley via Altamont; BART “Regional Expansion;” New BART Transbay Tube; and new San Francisco Subway.
- **Alternative 2 – Year 2050 – Regional Rail with Railroad-Based Services**
Expansion Focus: No high-speed rail; lightweight passenger rail system separated from freight on high volume corridors (higher speed, grade separated and electrified system); Transbay rail tunnel to allow extension of Peninsula electrified service to connect with East Bay; freight operating practices independent from passenger operations; and BART “Mass Transit” provider with additional stations and short extensions.
- **High-Speed Rail – Year 2050 – Entry from East via Altamont Pass:** Starting with the recommended Regional Rail network without High-Speed Rail, revisions were made to the regional network to reflect the inclusion of a high-speed alignment entering the Bay Area from the East.
- **High Speed Rail – Year 2050 – Entry from South via Pacheco Pass:** Starting with the recommended Regional Rail network without High-Speed Rail, revisions were made to the regional network to reflect the inclusion of a high-speed alignment entering the Bay Area from the South.

Evaluation Criteria

The evaluation of the study alternatives was conducted on a corridor-by-corridor level using the following criteria:

- **Engineering Feasibility:** Railroad track, stations, maintenance facilities, major structures, signal and communication systems and potential electrification.
- **Capital Cost** Estimates were developed for each corridor option, based on the engineering feasibility analysis.
- **Travel Demand:** Travel forecasts were derived from two modeling systems: (1) MTC's intraregional travel model and (2) the statewide interregional model developed for MTC and California High-Speed Rail Authority to evaluate high-speed rail alternatives in the state.
- **Operational Impacts:** "Sketch plan" evaluation of capacity. based upon readily available information.
- **Connectivity:** Major connectivity stations and their potential services, organized by importance in terms of population served and operators present.
- **Environmental Issues:** Corridor options were screened to identify major environmental concerns including impacts to natural resources, section 4(f) impacts, environmental justice, and right-of-way impacts.
- **Implementation Issues:** Consistency with existing transportation plans, existing corridor ownership and usage (including freight traffic requirements), major environmental issues that may present implementation risk, and other factors.

ES.3 RECOMMENDATIONS

Regional Rail Without High-Speed Rail

The two systemwide alternatives – Alternative 1 Regional Rail with BART Systemwide Expansion and Alternative 2 Regional Rail with Railroad-Based Services Expansion – were evaluated on a corridor-by-corridor basis taking into account the evaluation criteria described above. For each corridor, a recommended corridor treatment has been identified. In some cases, the recommended alternative consists of a blend of the two system alternatives or includes refinements suggested by the evaluation process. Maps of the recommendations are shown in Figures ES-3 through ES-6.

- **BART** – Reinvest in existing system to improve reliability and make the following improvements:
 - Improve Core Capacity by making modifications to vehicles, stations, track and signals as they are replaced and upgraded to accommodate passenger growth over the long term
 - Implement Resolution 3434 extensions to Warm Springs, Santa Clara County, and eastern Contra Costa County.
 - Implement improvements to connect BART with standard railroad services and regional bus lines in various corridors including a one-station extension to an intermodal with ACE at Isabel/Stanley
- Construct 4th track through Oakland to facilitate throughput and improve transfer convenience between East Bay and Transbay lines
- Develop Infill stations at various locations keyed to local land use opportunities in accordance with BART station planning policies
- Further define “Metro” service plan to increase capacity, coverage and reliability to inner Bay Area including the Oakland - Transbay – San Francisco zone; service plan may provide for new skip stop or expanded mid-line turnback capability.
- In the longer term, pursue construction of a second Bay Crossing with new subway line to improve coverage to San Francisco in the long term (paired with rail tunnel)
- **US 101 North** – Implement SMART project; service plan in the early years will have trains operating on 30-minute headways during peak periods with an approximate 90-minute schedule between Larkspur and Cloverdale. Make capacity and operational improvements over the long term to support 20-minute peak headways and higher ridership levels.
- **North Bay** – Preserve corridor in near and intermediate terms and consider as appropriate to develop north-south and east-west services using standard equipment in the long term with service frequencies on each route of approximately 60 minutes throughout the day and timed transfers at key locations.

- **I-80 & East Bay** – Expand the East Bay rail network from San Jose to Sacramento to 3 tracks with 4 track sections from Oakland to Richmond and in Solano County to support operation of standard higher speed railroad rolling stock compatible with freight traffic. Reduce travel time between Sacramento and San Jose to 149 minutes. Some of the service in the inner East Bay may be provided by shorter distance trains operating between Union City and Hercules.
- **Transbay** – Provide near term investments in BART Core Capacity including provision of higher-capacity cars, track and signaling and operational improvements; in the longer term, provide new transbay tube and San Francisco BART line paired with rail tunnel in long-term future to distribute passengers and relieve overcrowding on the existing tube.
- **Peninsula** – Expand Caltrain to 3 or 4 tracks where feasible and operate with lightweight electric multiple-unit equipment for rapid acceleration and frequent express and local service. Operate trains at 7-1/2 minute headways during peak periods and 15 minutes off peak.
- **South Counties** – Extend service to Salinas with further expansion using standard equipment to provide rail connections to Monterey and Santa Cruz. Approximate hourly service would be provided on all lines with timed transfers at key locations.
- **Dumbarton** – In the near term, implement service between Union City and Redwood City with standard

railroad rolling stock. In the longer term, separate passenger-only trackage from Redwood City to Union City to support operation of lightweight equipment compatible with Peninsula train operations allowing Dumbarton trains to interline with Peninsula services. Peak period trains would operate at 30-minute headways between Union City and the Peninsula with hourly service throughout the day.

- **Tri Valley / I-680** – Add trackage to the existing UPRR line and/or put segments of the abandoned SPRR back in service to support expanded and improved passenger service along the ACE rail corridor and to accommodate regional freight trains. Hourly service would be provided in both directions with 30 minute service for peak period peak direction trains; approximate 100-minute running time between Stockton and San Jose. Develop regional bus options in the I-680 corridor.
- **Central Valley** – Provide a regional corridor service between Sacramento and Merced over the long term, interlined with ACE services and complementing the San Joaquin long haul trains. Regional trains would operate on hourly schedules between Merced and Sacramento. Additional trains would operate from Modesto to Oakland or San Jose also on an hourly schedule resulting in 30-minute service over Altamont Pass between the San Joaquin Valley and the Bay Area.

Figure ES-3



Figure ES-4

2050 Regional Rail Without High-Speed Rail
(North)

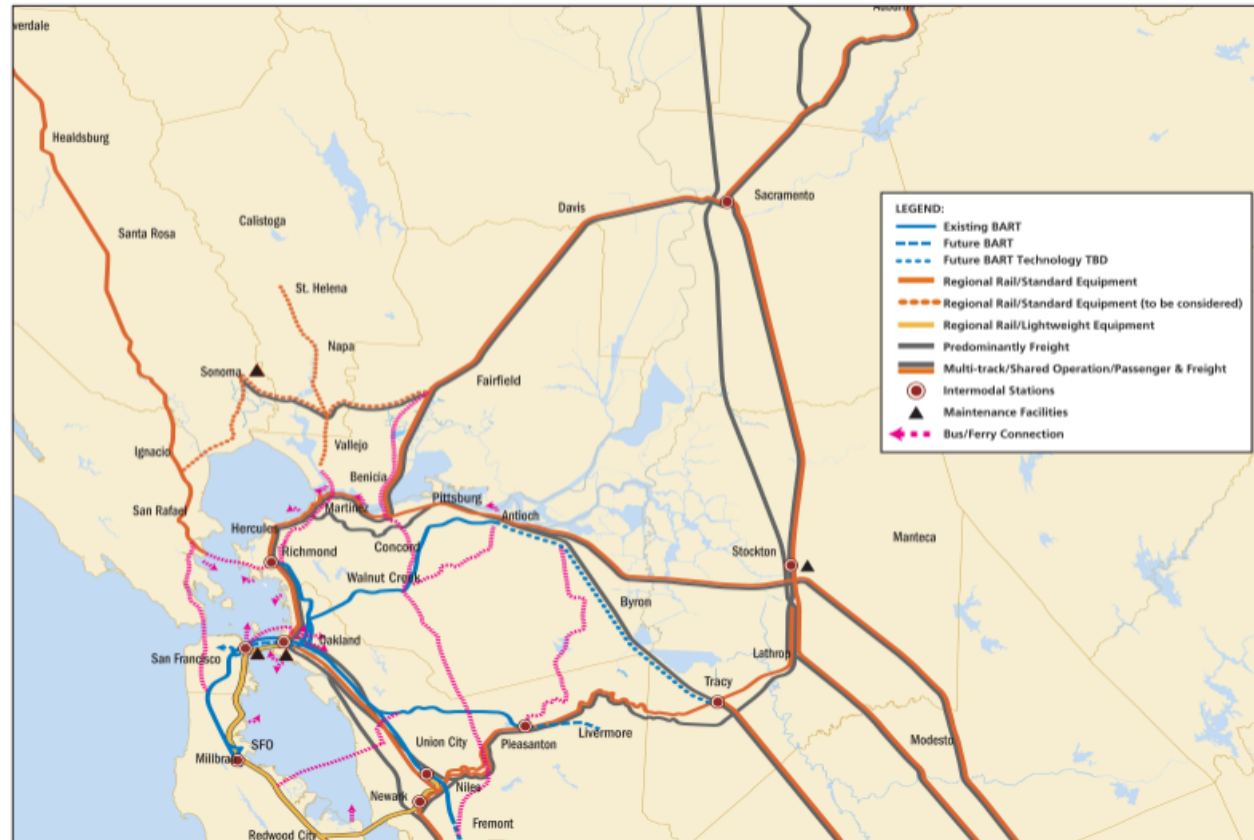


Figure ES-5

2050 Regional Rail Without High-Speed Rail (Central)

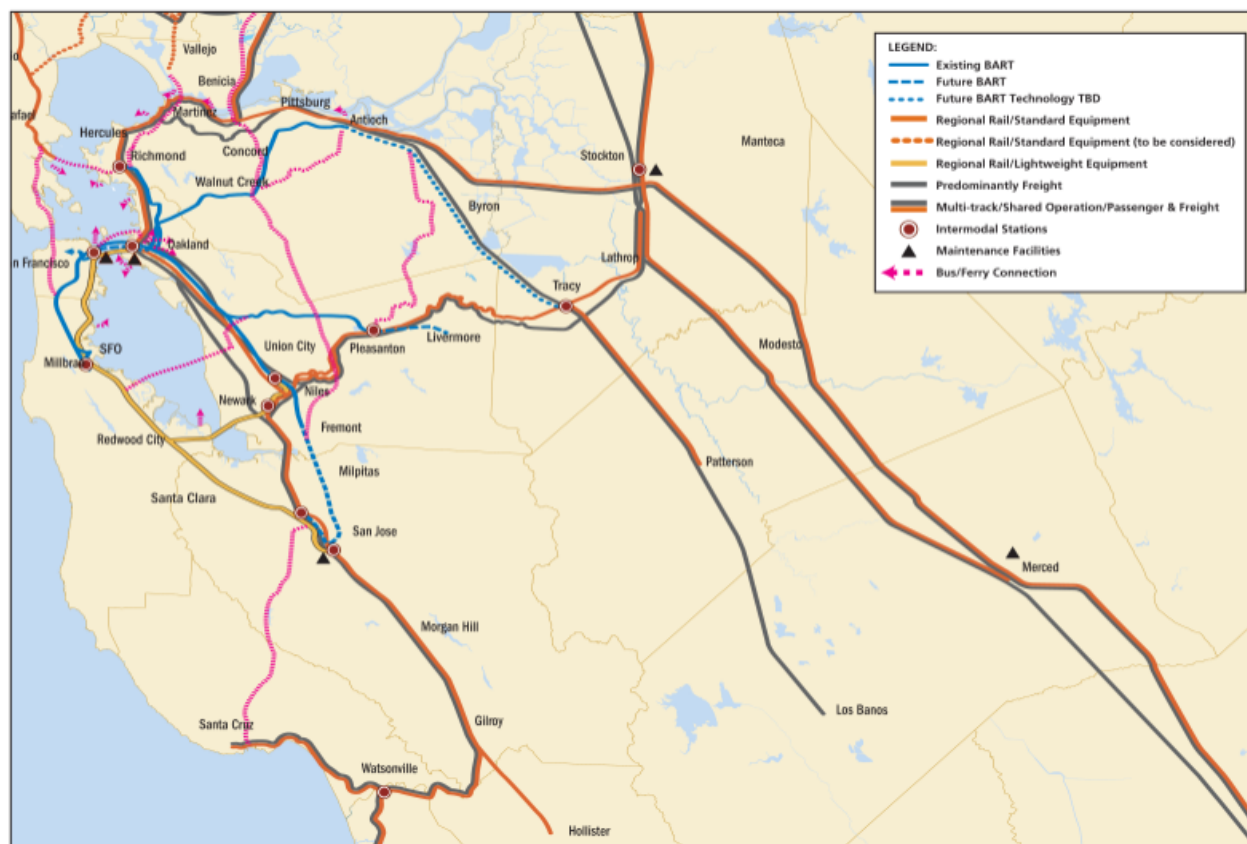
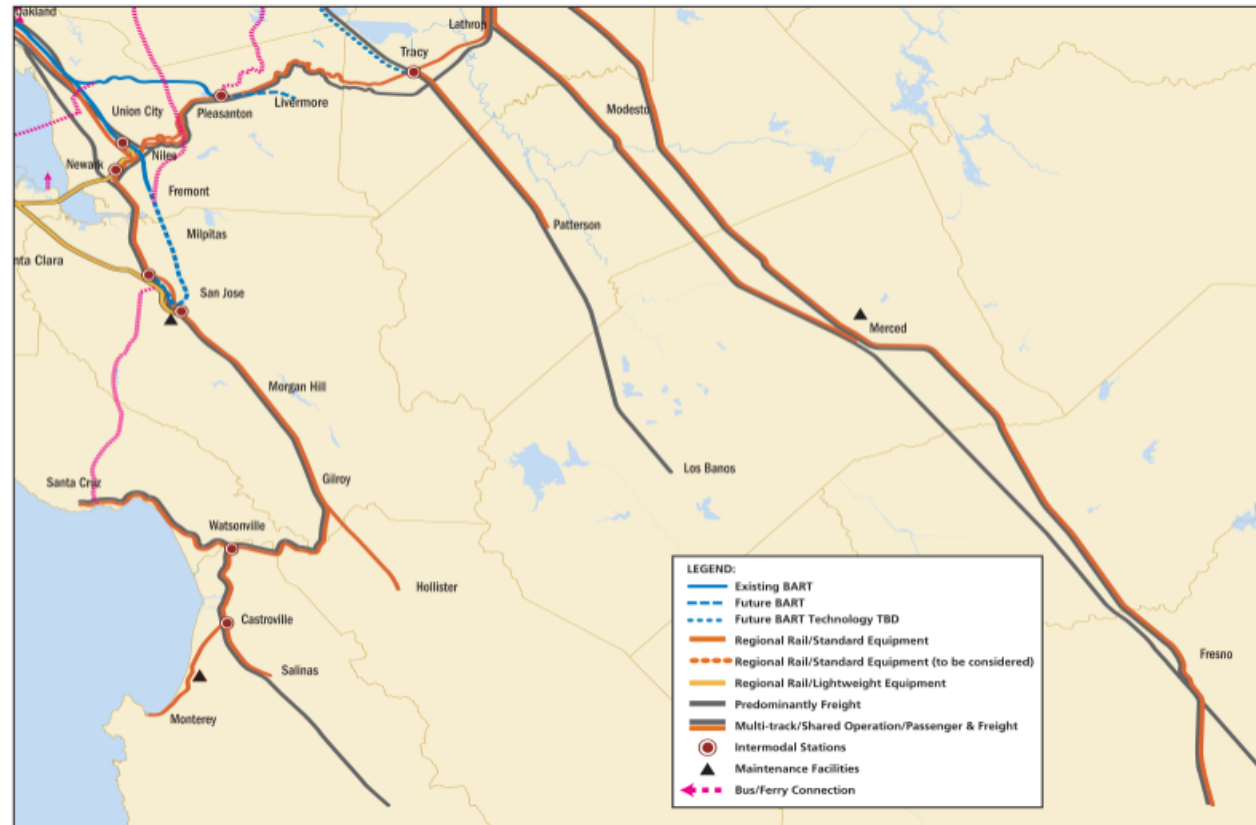


Figure ES-6

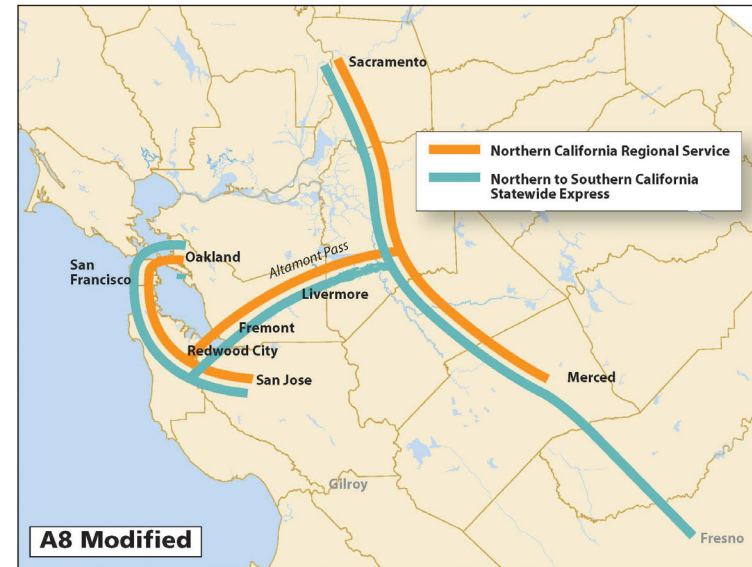
2050 Regional Rail Without High-Speed Rail (South)



Regional Rail with High Speed Rail

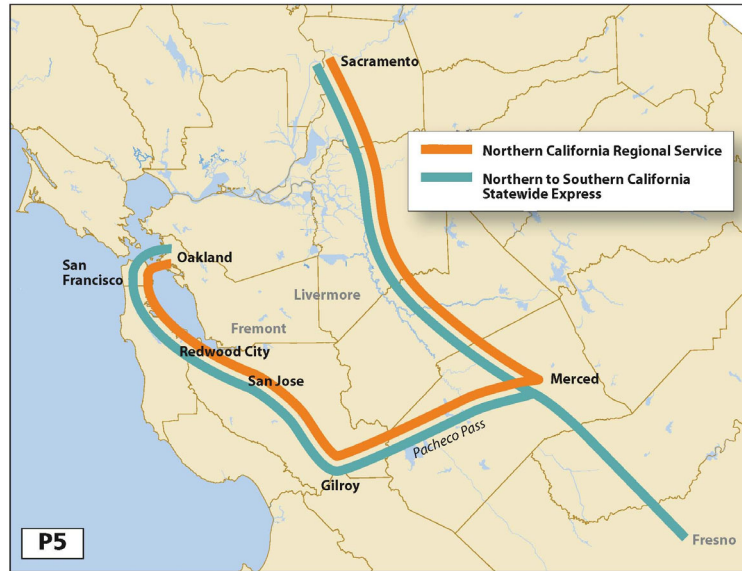
- The Regional Rail analysis identified numerous opportunities to operate regional “overlay” services across high speed lines within Northern California – these regional services would serve five distinct regional sub-markets including: Northern San Joaquin Valley, Altamont/Tri Valley, South Counties, East Bay and Peninsula. Implementation of these services would require provision of 4 tracks at regional stations as well as approaching and departing the regional stations.
- The Regional Rail plan evaluated eight alternative configurations for high speed lines connecting Bay Area metropolitan centers with the Central Valley and Southern California.
- Both Altamont and Pacheco options have similar total cost ranging from \$16 – \$18 billion (Year 2006) depending upon the configuration. These costs are generally about \$1-billion higher to accommodate regional services, depending upon the alternative.
- An Altamont alignment with a Dumbarton Bridge crossing utilizing the Peninsula trackage to provide direct service to San Jose and San Francisco with a long term tunnel connection to Oakland would have generally higher ridership and generally lower cost than other alternatives. This alternative would be stageable from Phase 1 peninsula improvements.

San Francisco and San Jose via SF Peninsula with Oakland via Transbay Tube (“A8 Modified”)



- Such an Altamont alternative would serve nearly 20-million Northern California regional trips (between points from Merced and to the north) in Year 2030.
- A Pacheco alignment using the Peninsula with a long-term tube connection to Oakland would have highest ridership and lower cost than an option which would require construction of a second line in the East Bay to reach Oakland.
- Such a Pacheco alternative would result in highest service levels to the major metropolitan centers as San Jose, San Francisco, and Oakland would be served by all trains.

San Jose, San Francisco & Oakland via Transbay Tube (“P5”)



- Altamont and Pacheco alternatives have similar total regional ridership levels of approximately 54-million to 56-million Northern California trips in Year 2030 (including both intra-regional trips within Northern California as well as inter-regional trips to points south of Merced).
- An Altamont alignment would have higher regional ridership (between points located from Merced and north) of 20-million trips in Year 2030 vs. about 16-million trips for a Pacheco alignment – by contrast, a Pacheco alignment would have higher ridership between Northern California and Southern California (between points located from Fresno and south) of 40-million trips in Year 2030 vs. about 34-million trips for an Altamont alignment.

- If either Altamont or Pacheco were selected as the sole option, 4-track sections would be needed at regional stations as well as approaching and departing regional stops. These four-track sections would be required along the Altamont route between Fremont and Tracy and along the Pacheco route between San Jose and Gilroy. By contrast, with an Altamont + Pacheco option, two-track sections would suffice from San Jose to Gilroy and from Fremont to Tracy; additionally, a lower-cost bridge connection at the Dumbarton crossing could be developed thereby reducing the cost of a combination alternative by as much as \$1-billion compared to simply building both of the alignments separately.

San Francisco & SJ via Peninsula plus Oakland via Transbay Tube (“AP1”)



- The Altamont + Pacheco alternative would cost about \$21-billion and would carry nearly 57-million Northern California riders (100-million statewide riders) in Year 2030. Numerous regional overlay routes could be provided while maintaining highest service levels between Southern California and the three Bay Area metropolitan centers. It would provide the fastest travel time between San Jose and points south as well as a faster travel time between San Jose and Sacramento compared to a Pacheco only alternative.
- Regardless of which Altamont or Pacheco options would be developed, an initial phase of investment in the Peninsula alignment between San Jose and San Francisco would help make Caltrain, with an express/limited stop ridership potential of 6.3-million riders per year in 2030 “high speed rail ready”

There are a number of ways in which various high-speed rail segments could be implemented within Northern California. A project of the magnitude of high-speed rail would take a number of years to deliver from the point of view of environmental clearance, permitting and construction, regardless of funding availability. Given these unknowns, as well as choices regarding specific route alternatives, it is difficult to specify a sequencing of segments at this point in time. Any sequencing which would be developed should, if possible, take into account the ability to utilize portions of the completed network as soon as possible, regardless of the availability of the entire network.

Initial Bay Area Segment

Clearly the San Francisco Peninsula is a location which could be improved with or without high-speed rail. In accordance with both the phasing policy of CHSRA as well as the recommended Regional Rail options is improvement of the Peninsula corridor to make it “high-speed ready” for operation as a grade-separated, higher speed alignment suitable for use of electric multiple unit equipment. High-Speed rail limited stop trains could serve Peninsula destinations as a regional overlay to the long distance trains along with continued operation of local services.

Possible Altamont Pass Improvements (“A8 Modified”)

Early Elements

- Electrification of Dumbarton Service
- Separate Passenger Only Trackage Through Tri-Valley Area
- New High Speed Alignment over Altamont

Later Elements

- 4 Track Stations and Approach Tracks (Fremont – Tracy)
- Tracy Intermodal
- Tunnel Beneath Niles Canyon
- New High Bridge at Dumbarton
- BART Extension to Livermore Station

Possible Pacheco Pass Improvements (“P5”)

Early Elements

- Two-track connection San Jose to Valley Line
- Improve ACE for Regional Service

Later Elements

- 4 Track Stations and Approach Tracks (San Jose – Gilroy)
- Gilroy Multimodal for South Counties Service
- Tunnel Beneath Niles Canyon
- New High Bridge at Dumbarton
- BART Extension to Livermore Station

Possible Altamont + Pacheco Pass Improvements (“AP1 Modified”)

In the event both the Altamont and Pacheco alignments were included in the high speed rail network, an even broader set of segments would be available and there would be more choices for advancing individual projects on either or both alignments depending upon funding and priorities.

Early Elements

- Electrification of Dumbarton Service
- Separate Passenger Only Trackage Through Tri-Valley Area
- New High Speed Alignment over Altamont
- New Express Tracks SJ – Central Valley via Pacheco

Later Elements

- Tracy Intermodal
- Tunnel Beneath Niles Canyon
- New High Bridge at Dumbarton
- BART Extension to Livermore Station
- Gilroy Intermodal for South Counties Service

ES.4 SUPPORT STRATEGIES

Land Use

By 2050, the Bay Area will add 40 percent more residents, San Joaquin County's population will more than triple, and Sacramento County will grow 132 percent. It is imperative that our regions continue to plan and focus our growth and development in core areas; produce quality, higher density housing (particularly affordable housing) for our residents; and make tighter connections between our land-uses and transportation infrastructure.

The Regional Rail Plan calls for a comprehensive land-use strategy that optimizes opportunities to better plan and provide for supportive land-uses at rail stations, key connectivity points, and along rail corridors. Rail project implementation must be fully integrated with supportive land-uses in order to establish the ridership markets that will be needed to justify these hefty investments. While land-use authority remains the prerogative of local governments, agencies involved in the Regional Rail Plan should integrate land-use into decision-making regarding where, when, and how to expand and improve our rail system. The following are the key considerations to enhance existing programs:

1. Monitor, Update and Expand Rail Station TOD Policies
2. Adopt Ridership Development Plans for the Broader Commute Shed
3. Seek State Bond Monies for Infill and Transit-Oriented Development
4. Expand the Resources Available to Help Cities
5. Create a One-Stop Shop for Technical Assistance

6. Encourage Local Municipalities to Adopt Supportive Station Area Policies

Governance

The Bay Area has four providers of regional passenger rail services: Caltrain, BART, Altamont Commuter Express (ACE), and Capitol Corridor. New services identified in MTC Resolution 3434 will result in development of additional rail corridors involving additional jurisdictions and added complexity due to additional geographic overlaps. For these reasons, and as required by the enabling legislation authorizing and funding conditions for this Regional Rail Plan, the governance strategy was considered with respect to modifications which would support implementation of the Regional Rail Plan.

A literature review was conducted to identify various governance structures that would have potential applicability to Northern California:

- **Decentralized** – Characterized by multiple service providers with separate governance structures, as represented by the status quo in Northern California
- **Regional Federation** – A loose form of association under an umbrella organization responsible for implementation of joint initiatives. Services are delivered within the region of the federation by separate operating entities each having separate staffs and reporting to separate boards.
- **Regional Rail Authority** – This model illustrates the functional consolidation of all regional passenger rail services. All passenger rail services are unified under a

single governance structure responsible for all aspects of rail ranging from planning and design to maintenance and operations.

- **Consolidated Regional Rail** – Consolidated authorities may have broad power ranging from funding through maintenance and operations over multiple modes with large geographic areas.

Two workshops with general managers and elected representatives from Bay Area rail providers were held to consider the issues and models as well as potential risks and benefits. The following potential benefits and risks were identified with respect to moving toward a more centralized form of regional rail governance:

Potential Benefits

- Schedule Coordination
- Centralized Operations
- Uniform Fare Structure and Collection
- Railroad Negotiations
- Procurement Economies of Scale
- Improved Customer Service
- Streamlined Administration

Potential Risks

- Reduced Local Accountability and/or Autonomy, perceived or real
- Potential for Higher Labor Costs
- Potential for Work Stoppages

Consensus emerging out of the partner workshops is that:

- A single or consolidated authority carries higher degree potential risks
- Existing regional coordination efforts are consistent with the evolution of a federation model
- Additional steps toward a federation model include strategies to coordinate fares, schedules and wayfinding, centralize operations and dispatching, joint right-of-way negotiations, and regional procurement.

These questions ultimately are policy issues for resolution by MTC and affected rail operators.

Findings and Recommendations

1. MTC and Bay Area rail operators have engaged in a series of initiatives to improve the customer experience of rail transit as an integrated system – e.g., trip planning, customer information and fare collection – these initiatives should be fully deployed and the customer experience further integrated through coordinated joint efforts involving the operators under the direction of MTC.
2. The Bay Area is increasingly engaged both from the perspective of economic, demographic and travel factors with adjoining Northern California areas especially with respect to the Northern San Joaquin Valley to the East but also including counties to the South and North.
3. From the Regional Rail planning process it has become apparent that there is no single existing entity in greater Northern California which spans the geographic scale of the emerging “megaregion”.

4. A greater integration of project development, planning and initiatives aimed at further integrating and enhancing the customer experience could be gained by formalizing relationships between planning, funding, construction as well as maintenance and operations of rail services through a “federation” of Northern California entities.
5. In the longer term, a new federation could, with new funding and a mandate to implement regional rail solutions. These would include efforts such as addressing right-of-way needs, access to private freight lines, and dispatch of public sector or joint corridors.
6. To this end, it is recommended that near term steps be undertaken to formalize a rail federation.
7. As such in the near term no new rail operators should be “chartered” or established which would provide new services that are interconnected with the regional network.

Funding

The estimated total capital investment for this plan is about \$45 billion in 2006 dollars. Overall, finding public and private revenues to fund capital construction is a sizeable challenge, which the region has tackled successfully in the past. However, the much bigger challenge is securing additional revenues to pay for operating costs. This is why complementary land-use strategies are so important to maximize ridership and minimize the need for additional operating subsidies.

Forging regional consensus behind a program of projects to advocate for and pursue federal, state and regional funding has proven to be a critical first step in delivering high-priority rail expansions. Resolution 3434 is a roughly \$13.5 billion program of rail, regional express bus, and ferry enhancements and expansions. The financial plan for Resolution 3434 is comprised of an array of federal, state and local sources and matched funds to projects based on project competitiveness and eligibility. MTC is currently developing a Resolution 3434 Strategic Plan, scheduled for release in 2008, to provide a financial framework for successful program and project delivery.

Funding for Regional Rail Plan investments beyond current Resolution 3434 commitments will likely come from multiple sources, as follows:

- **Federal:** Federal funding categories include New Starts, Small Starts/Very Small Starts, and other Federal Transit Administration funding categories. Most of these funding sources are dependent on annual appropriations from the federal government, though some programs are multi-year.
- **State:** In 2006, California voters passed Proposition 1B, which provided roughly \$20 billion for transportation purposes statewide; that amount includes \$2 billion for freight-related infrastructure improvements (including rail freight) and another \$1.3 billion for Bay Area transit improvements. In 2008, California voters are slated to decide on a High-Speed Rail Bond that will provide a substantial down payment towards the implementation of state-of-the-art high-speed rail system connecting the Bay Area to southern California. Other matching state and

federal funding sources, as well as the CHSRA's broad contracting powers to secure private sector funds, will be pursued to fully implement the envisioned high-speed rail system.

- **Regional:** Regional funding has been an important contributor to the funding and delivery of numerous transportation projects in the Bay Area. Regional Measures 1 and 2 toll bridge funds are fully committed to projects and programs identified in their respective expenditure plans. Any potential surplus of toll revenues generated would be directed toward the regional bridge seismic program. Per the Streets and Highways Section 3091(h), the MTC/Bay Area Toll Authority shall, by January 1, 2020, submit a 20-year toll bridge expenditure plan for RM2 to the Legislature for adoption. Further, this expenditure plan shall have, as its highest priority, replacement of transit vehicles. When the expenditure plan is developed, there may be potential opportunities to advocate for toll bridge funding for rail expansion projects identified in this Regional Rail Plan.
- **Local:** Local transportation sales tax measures have been the bulwark of the Bay Area's transportation funding over the past two decades. To date, seven of the nine Bay Area counties have successfully enacted voter-approved transportation sales tax initiatives. Future local sales tax funds, developer fees and private capital may be available for rail projects.
- **Public/Private Partnerships:** Private investment, mainly from the rail freight operators (Union Pacific and BNSF Railway) will be an important funding source to

implement the railroad-based improvements recommended in this plan. The private railroads have and will continue to be funding partners to improve freight and passenger rail service to implement improvements that are mutually beneficial to both. As an example, the \$2 billion in Proposition 1B funding for freight infrastructure improvements requires up to a 50 percent match; the private railroads have indicated their interest in participating financially with local entities to secure some of this funding for local rail freight improvements.

- **Creative Financing:** New revenue streams may be available in the future. Two examples of potentially emerging opportunities include:
 - **Congestion Pricing** – Pricing of access to crowded major highway facilities could be used to implement rail improvements. This strategy could off-set some of the social equity issues associated with congestion pricing in that proceeds from a pricing strategy could be used to support basic transportation needs for those not able to afford priced highway options.
 - **Carbon Credits** – As initiatives are developed to fight global warming, participation in development of rail lines, especially those which would be electrified, or conversions to more energy-efficient lightweight equipment could be funded by private investors interested in receiving credits for reduction of pollutants and greenhouse gases.

ES.5 IMPLEMENTATION

Implementation of the Regional Rail Plan will require a comprehensive approach. The following key considerations pertain to plan implementation:

- **Phasing** – The Regional Rail Plan report identifies a possible phased implementation plan which addresses near term (Year 2015) medium term (Year 2015 – 2030) and long term (post Year 2030 to Year 2050 and beyond) timeframes
- **Funding** – Assembly of nearly \$50-billion present-day dollars for development of the Northern California regional rail network, including Resolution 3434 commitments and BART reinvestment, will require significant new sources of funds; funding is a top priority concern
- **Governance / Rights-of-Way Arrangements** – Opportunities for joint programs or for new initiatives, which could be undertaken in the near term under a federation of existing operators, may be pursued further as part of potential new legislation. In the longer term, a regional rail federation could provide an umbrella under which negotiations with freight rail operators for acquisition of rights-of-way and operating rights could proceed.
- **Land Use Policies** – Existing policies developed separately by BART, MTC and other entities governing station area developments could be unified and broadened to pertain to the Northern California “mega-

region” to assure that the highest densities are developed along rail corridors and around stations/major connectivity points, thereby establishing the ridership markets and providing convenient access to the regional rail network.

- **Integration with Other Planning Efforts:** This Regional Rail Plan only focused on a single transportation mode – rail. Therefore, this plan will ultimately need to be integrated with other regional planning efforts such as the Regional High-Occupancy Toll (HOT) Network Study, regional express bus plans, Water Transit Authority’s Ferry Operations & Implementation Plan, MTC’s Freeway Performance Initiative, and other regional and local planning efforts.

ES.6 NEXT STEPS

Projects advanced under the Regional Rail Plan would be implemented in accordance with existing project planning, funding and project development procedures.

The following specific follow-on efforts are recommended:

- **Evaluation Measures** – MTC adopted rail system expansion and improvement criteria during the development of its Resolution 3434 transit expansion program, and is currently developing a Resolution 3434 Strategic Plan to provide a framework for successful program and project delivery. This Regional Rail Plan helps inform the next generation of rail expansion beyond Resolution 3434.
- **Travel Market and Ridership Analysis** – Detailed ridership studies to evaluate corridor service options
- **Land Use Analysis** – Sensitivity testing should be performed for Regional Rail projects to reflect on-going refinements to land use visioning, particularly more focused land use patterns
- **Service Model** – Additional analysis and testing should be used to identify specific operating plans including routings and frequencies
- **Cost Analysis** – Cost estimates prepared for the Regional Rail plan are planning-level, order-of-magnitude cost and will be refined to reflect the level of detail of the project description as projects are further developed
- **Environmental Clearance & Community Impacts** – As rail projects and services are developed, full environmental review and public involvement will be provided to refine project specifics and identify mitigation measures,
- **BART Operations** – BART will be leading its own effort to address passenger needs including development of criteria for infill stations, how to best implement its 30-year capital plan and strategic vision, constructing higher frequency line segments, skip-stop services and other improvements considered in this plan
- **High-Speed Rail** – The CHSRA has released a Draft Environmental Impact Report/Environment Impact Statement (EIR/EIS) for the Bay Area to Central Valley portion of a statewide high-speed rail system which provides information on high-speed rail options, costs, benefits and potential impacts. The CHSRA will be accepting comments through September 2007 on the draft environmental document to inform the decision making process regarding preferred high-speed rail alignments and station locations within the Bay Area to Central Valley study area. The Regional Rail process will provide input to the CHSRA as it prepares its final environmental document and decides on the preferred routing for high-speed rail between the Bay Area and Central Valley.

1.0 INTRODUCTION

It has been a half-century since the last comprehensive look at the San Francisco Bay Area's rail system. The 1957 Rail Plan for the Bay Area was one of the most ambitious efforts of its time, envisioning an integrated rail network covering all nine Bay Area counties. The plan's central conclusion still rings true today:

"If the Bay Area is to be preserved as a fine place to live and work, a regional rapid transit system is essential. ... A satisfactory solution to the Bay Area's traffic problem cannot be reached by building freeways alone. The solution can be reached only through a system of mass rapid transit developed on the premise of moving people—not automobiles."

On March 2, 2004, Bay Area voters approved Regional Measure 2, which increased bridge tolls on the region's seven state-owned bridges by a \$1, raising an estimated \$125 million each year. RM2 funds will implement the Regional Traffic Relief Plan — a comprehensive strategy for addressing congestion in the transbay bridge corridors and enhancing the convenience and reliability of the Bay Area's public transit system. RM2 specified and provided funding for the preparation of a comprehensive master plan for Bay Area rail.

This Bay Area Regional Rail Plan seeks to complete the unfinished work of the 1957 plan, and to address new opportunities not anticipated in that plan.

Among the many changes that has occurred over the past 50 years is the emergence of Northern California as a

"megaregion" — an extended network of metropolitan areas including the Bay Area and its neighboring Sacramento and Central Valley regions that are linked by their transportation, economic and environmental systems. Improving the mobility of travelers, goods and services between the cities within our growing megaregion has become increasingly important to ensure the health and productivity of each metropolitan area and the megaregion as a whole. This plan keeps this challenge in mind as it defines new regional rail investments.

The charge for this Regional Rail Plan is to examine ways for the Bay Area to incorporate passenger trains into existing rail systems, improve connections to other trains and transit, expand the regional rapid transit and railroad-based rail network, increase rail capacity, and coordinate rail investment around transit-friendly communities and businesses.

This plan also includes an analysis of potential high-speed rail routes between the Bay Area and Central Valley. It offers recommendations on the most promising high-speed rail alignments for Pacheco and Altamont passes. These recommendations are formulated independently of the California High-Speed Rail Authority (CHSRA). The intent of this plan is to provide input to the CHSRA as it prepares its final environmental document for the Bay Area to Central Valley High-Speed Train Program. The CHSRA will ultimately decide on the preferred route for high-speed rail between the Bay Area and Central Valley.

2.0 REGIONAL RAIL PURPOSE AND NEED

2.1 Plan Purpose

The purpose of creating the Regional Rail Plan is threefold:

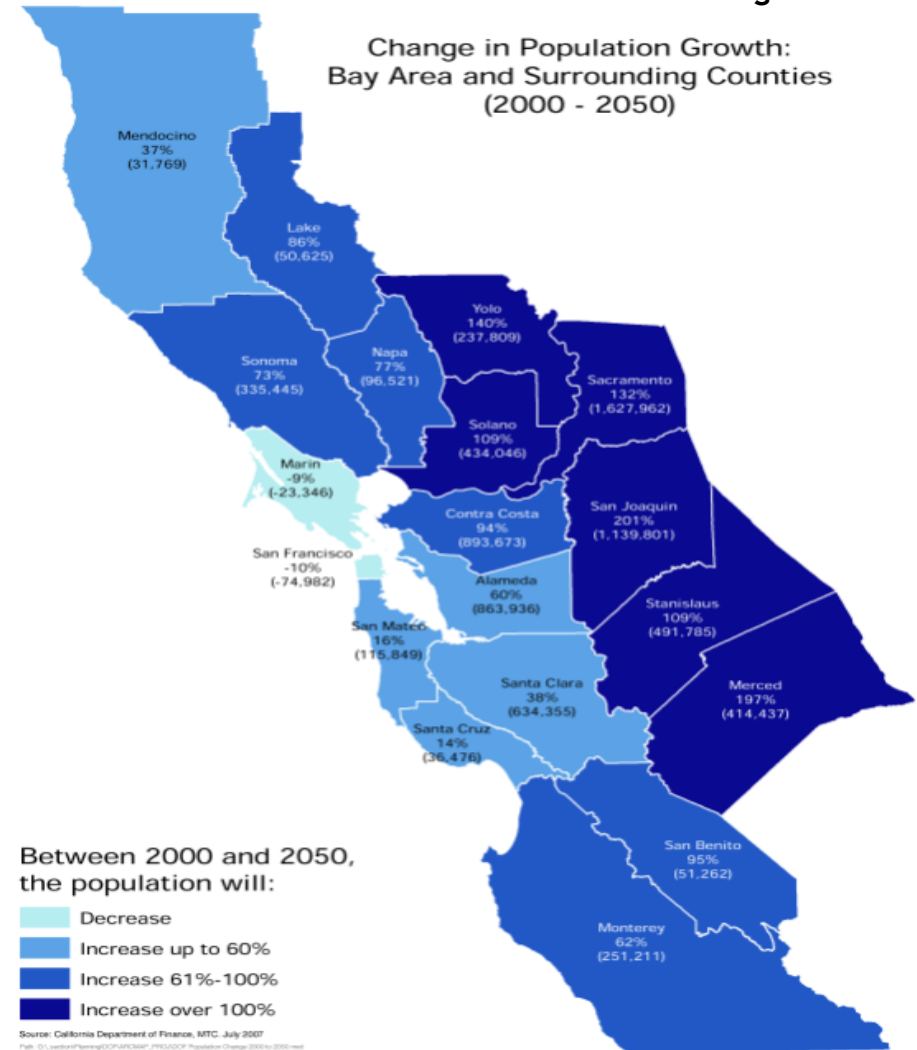
- To comprehensively identify a vision for a robust, interconnected system of Bay Area passenger rail improvements and expansions to guide investment decisions;
- To create a safe, fast, reliable, and integrated passenger and freight rail network that addresses the tremendous growth anticipated in transportation demand; and
- To sustain and enhance the economic vitality of Northern California, while minimizing the impact on the environment, by providing excellent transit service that strengthens existing downtowns and economic centers.

2.2 Why Rail Is Important to the Bay Area

• A Growing Region

Today, the nine-county Bay Area is home to nearly 7 million people and supplies more than 3 million jobs. By 2050, the region's population is anticipated to grow by over 40 percent for a total of 10 million people, as shown in Figure 1. This population growth will place tremendous pressure on the existing transportation network. The total number of daily trips made by Bay Area residents is projected to grow by 35 percent to a total of 28.5 million by 2030, wherein we will be logging over 200 million vehicle miles of daily travel. Further, by 2030, work trips by transit will see a net increase

Figure 1



of 433,000 transit riders on an average weekday or about 108 million additional transit riders each year. Added capacity and expansions will be required in order to accommodate increased demand on the existing transit system.

Figure 2

- In-Commuting from Neighboring Sacramento and San Joaquin Valleys**

While the Bay Area continues to grow at a steady rate, our Sacramento and Central Valley neighbors are experiencing their own tremendous population growth. San Joaquin County, just east of the Altamont Pass, will see more than a 200 percent increase in population by 2050. Similarly, Sacramento County will experience a 132 percent growth increase. The greatest increase in travel growth into the Bay Area over the next few decades is anticipated to come from these neighbors to the east. By 2030, in-commute into the Bay Area by commuters from the Sacramento Valley will rise by over 200 percent (+49,000 commuters) and San Joaquin Valley will grow by 112 percent (+60,600 commuters), as shown on Figure 2. Without stronger transit systems leading to the main Central Valley cities and connecting them to each other, there will be fewer opportunities for the cities to plan for the kind of compact development that the Bay Area is moving towards.

- International Trade and Regional Freight Movement**

The region's economy depends on the movement of goods within, into and out of the Bay Area. Freight traffic demands is expected to grow in excess of 350 percent over the next 50 years. The growth is already happening; bulk cargo grew 23 percent growth in one year between 2003 and 2004. Many of these lines are shared by passenger rail, such as the Capitol Corridor, and all of them are approaching their capacity. Expanded and improved rail infrastructure will be needed to support the demands of freight and passenger growth to mitigate the explosive growth of truck traffic on our roads.

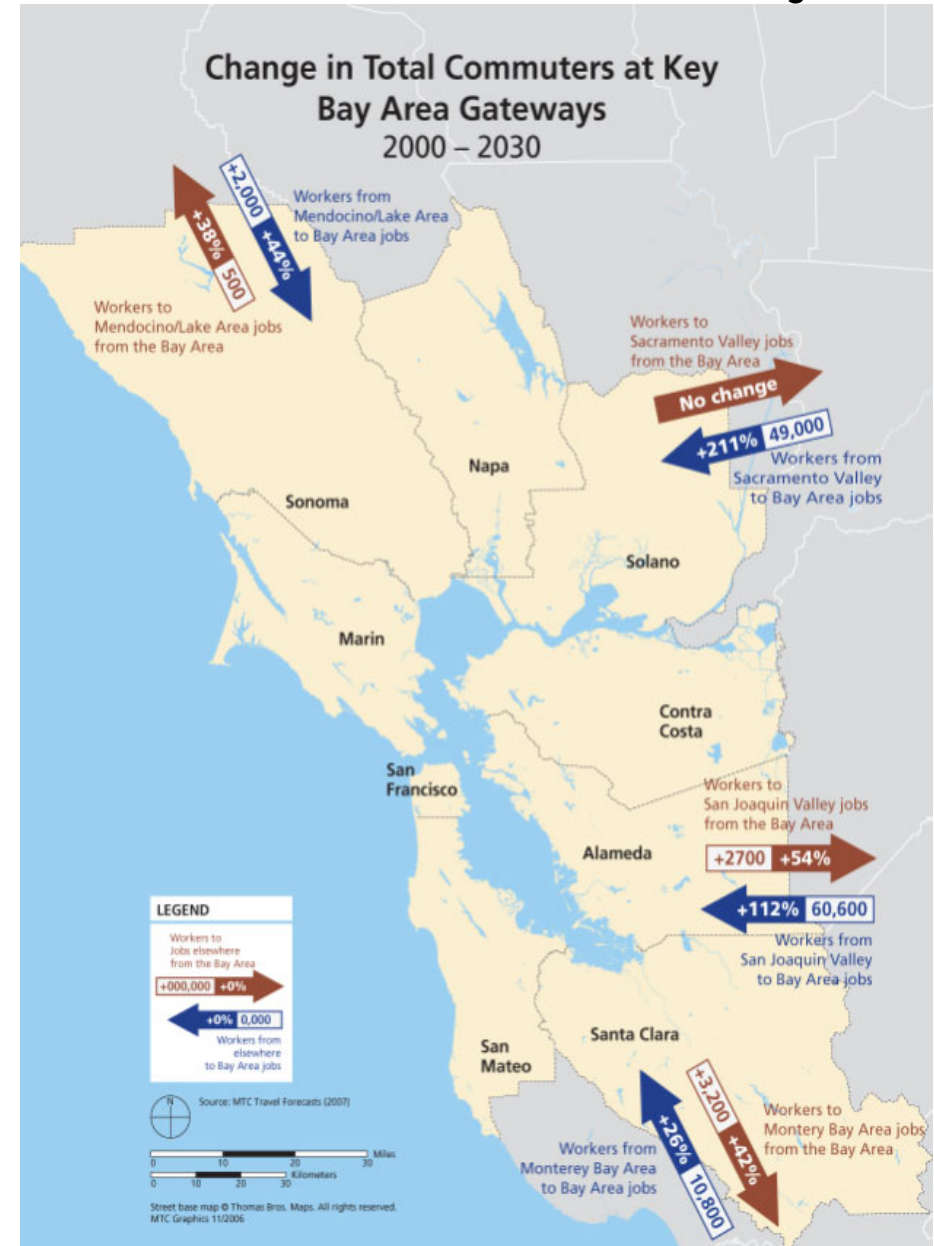
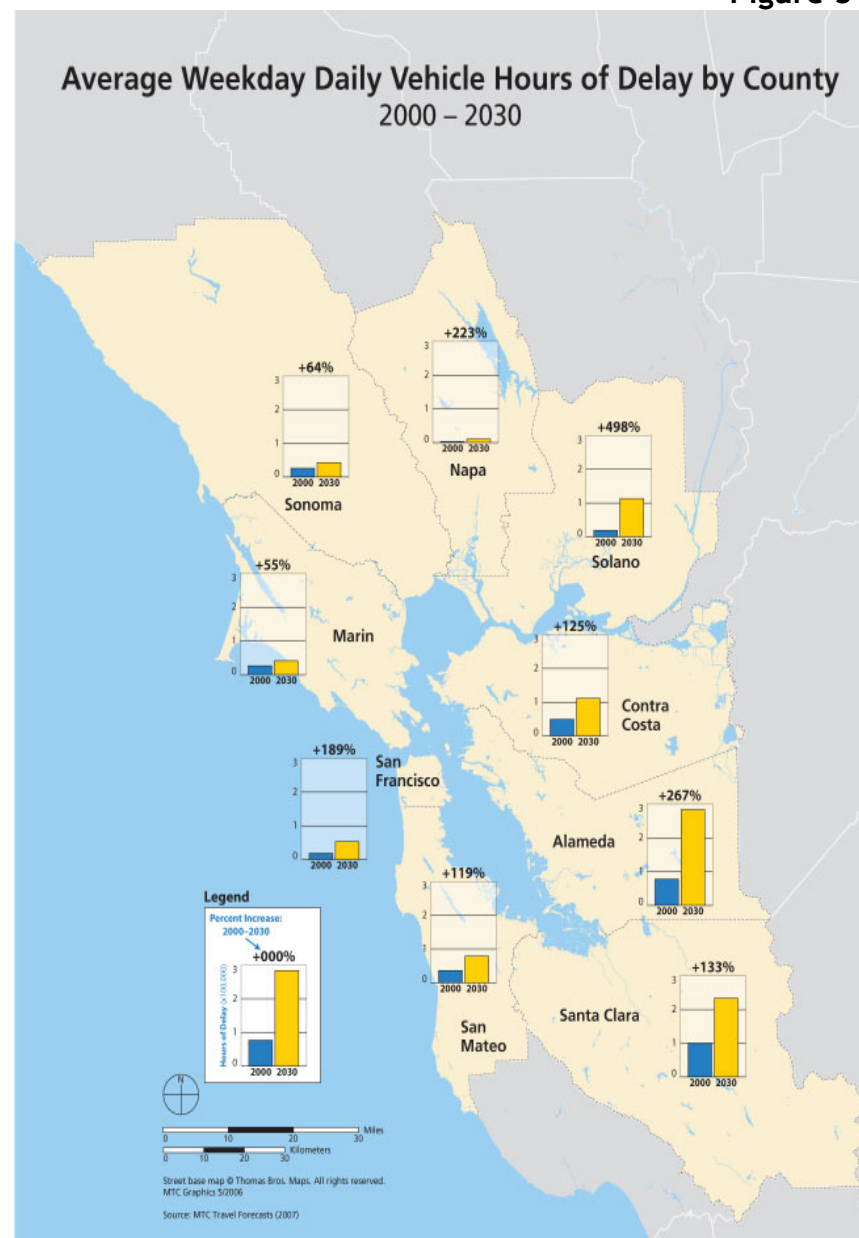


Figure 3

- **High Levels of Traffic Congestion**

Bay Area polls often find persistent traffic congestion as the primary concern for our residents. Congestion often seems to come “out of nowhere” but there is clear cause – as the volume of traffic exceeds a road’s capacity, the speed of traffic decreases exponentially rather than gradually. Solano County provides an acute example of how conditions can degrade quickly once roads are saturated. Dispersed growth patterns, tremendous truck traffic in the I-80 corridor, and significant increase in interregional commuting between the Bay Area and Sacramento have lead to higher transportation demand in Solano County. As a result, Solano County is projected to experience about 500 percent growth in daily vehicle hours of delay in 2030 as shown in Figure 3. Other travel corridors throughout the Bay Area are experiencing similar congestion and delay.



2.3 Consequences of Not Addressing Bay Area Rail Needs

- **High Cost to Our Economy**

The adverse economic impacts of congestion and inadequate transit access are already becoming apparent. The 150,000 daily hours of Bay Area commute congestion had an estimated cost of \$2.6 billion in 2003 alone. And, congestion would have been about 50 percent worse if not for the region's public transit system, according to the Texas Transportation Institute's 2005 Mobility Study Performance Measure Summary. The region's economy is becoming increasingly reliant on shipping from our ports – whether vegetables from the Central Valley or electronics from Silicon Valley. Longer shipping times because of congestion can add significant cost to these goods.

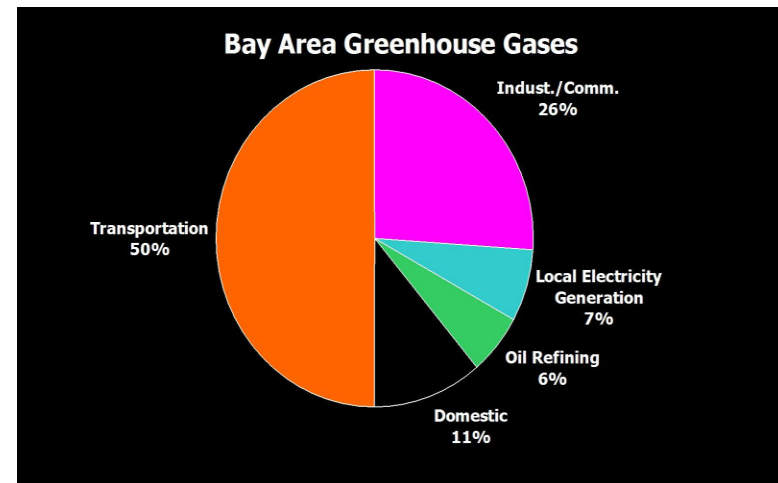
- **High Cost to Our Environment**

Without an expanded rail system, the natural environment may also suffer. Over 400,000 acres of land in the Bay Area are at risk from development. Promoting development in walkable communities near transit is our best hope for taking development pressure off open space and farms. According to the Reconnecting America and the Center for Transit-Oriented Development, there is an anticipated demand for an additional 550,000 homes near transit in the Bay Area by 2030. Compact, transit-oriented development only functions well when transit service is frequent and reliable enough that residents will ride, foregoing owning an additional car and reducing the number of car trips they take.

- **High Energy Consumption and Greenhouse Gas Emissions**

A fast growing environmental concern is global climate change, and the transportation sector is responsible for 40 percent of California's greenhouse gas emissions, and up to 50 percent in the Bay Area (see Figure 4). These emissions are directly proportional to the amount of gasoline burned, so offering real transportation choices that can reduce driving will be critical for cutting greenhouse gas emissions.

Figure 4



3.0 REGIONAL RAIL VISION

Key elements of the Regional Rail vision include:

- **Ring the Bay with Rail**

A long-term vision of many in the region is to ring the Bay, connecting the three major Bay Area cities (San Francisco, Oakland, and San Jose), with a fast, frequent and integrated passenger rail network. BART and Caltrain would provide seamless, peak and off-peak rapid transit service to the region's largest employment and population centers, with intermodal connections at key nodes. In addition, the rail network would also provide direct or indirect transit access to the region's major international airports and numerous local transit hubs.

- **The Right Technology Should Be Used With the Right Corridor**

A broad range of rail technologies, including BART and conventional passenger trains like Amtrak are considered in this plan. Emerging technologies such as non-Federal Railroad Administration compliant Electric Multiple Unit (EMU) trains are also explored. These trains run on standard gauge rail tracks but must be separated from freight trains. They have significant cost and speed advantages over conventional trains and are included in the plan on selected segments.

- **The BART & Caltrain Systems Are the Backbone**

The BART and Caltrain systems serve as the backbone of the regional rail network and it is clear there will be capacity constraints and renovation needs for the existing systems.

This reinvestment should be a top regional priority over the next few decades.

- **The BART System's Outward Expansion Is Nearly Complete**

While BART will always remain at the core of the region's rail system; its outward expansion potential is limited. Once the extension to San Jose is completed, and the existing lines are brought to logical terminals in Livermore, Santa Clara and East Contra Costa County, no additional outward extensions of the BART technology are contemplated. This is important, not only because portions of the existing BART system will be reaching capacity limits, but also because higher-speed express trains would better serve outlying suburban markets. Instead, BART will evolve toward a higher-frequency, highly productive metro system. New BART lines are considered only to alleviate capacity concerns in the Transbay Corridor and to serve dense urban markets in the inner East Bay and San Francisco, and to provide additional connectivity to the regional/inter-city rail system.

- **The Bay Area Needs a Regional Rail Network**

As the BART system becomes more of a high-frequency, close stop spacing urban subway system, similar to the Paris Metro or Berlin "U-Bahn" network, it would need to be complemented with a larger regional express network serving longer-distance trips. The European counterpart to the regional express network is the "S-Bahn" in Berlin or the Regional Electric Rail (RER) in Paris. These European rail systems provide a truly integrated inter and intraregional rail

system that minimizes transfer barriers for its customers. The next step is to incrementally separate passenger rail rights-of-way from freight rights-of-way and over time develop a higher speed, express regional rail network. These trains would run largely on existing tracks, some shared with freight and others in their own rights-of-way with specialized signaling and dispatch systems. Over the next 40 years, much of the new investment in intercity and suburb-to-city regional rail in Northern California will utilize modern, standard-gauge equipment, following the model of most European and Asian capitol.

- **Rail Infrastructure Must Be Expanded to Accommodate Growth In Passenger and Freight Traffic**

To allow the region's economy to continue growing while meeting increased passenger needs, the freight and passenger rail systems must be increasingly accommodated. This plan acknowledges that certain freight corridors require additional mainline tracks to support high-frequency freight and passenger services.

- **High-Speed Rail Provides Opportunities to Enhance and Accelerate Regional Rail Improvements**

High-Speed Rail complements and supports the development of regional rail – a statewide high-speed train network would enable the operation of fast, frequent regional services along the high-speed lines and should provide additional and accelerated funding where high-speed and regional lines are present in the same corridor.

- **Rail Transit and Focused Transit-Oriented Developments Must Go Hand in Hand:** If the region is to make a substantial investment in rail infrastructure, land development surrounding the stations/stops and along the

rail corridor must be fully integrated with rail services and they must be supportive of one another. Regional and local policies and programs that support focused land-uses must be in place to make this happen.

- **Institute a New Governance Structure for Delivery of Rail Services:** Delivering high-quality, efficient rail services will require institutional changes from the multiple transit operators and multiple providers of regional rail that are in place today. The “new” entity(ies) would be responsible for planning, design, funding, construction, and/or maintenance and operations of passenger rail. The region must set a course of action to initiate and implement the necessary institutional changes.

- **Successor to Resolution 3434 Needed to Advocate for Rail Funding:** Securing public/private funding for rail expansions and operations and maintenance is a tall order, but can be done if the region forges consensus behind a program of projects from which to advocate for funding in Sacramento and Washington D.C. MTC's Resolution 3434 set a powerful precedent that having a consensus agreement in place will help the region to not only articulate a shared vision about rail expansions but also lay out a strong advocacy platform to aggressively compete for scarce public/private, regional, state and federal funds. Furthermore, defining the rail improvements that go beyond Resolution 3434 would help to inform subsequent Regional Transportation Plan updates.

4.0 REGIONAL RAIL STUDY STRUCTURE & PROCESS

4.1 We've Been Working on the Rail Plan - A Team Effort

The Metropolitan Transportation Commission, the Peninsula Corridor Joint Powers Board (Caltrain), the Bay Area Rapid Transit District (BART), and the California High-Speed Rail Authority (CHSRA) joined efforts over the past two years to develop a long-range vision for improving the passenger rail system we have in place and expanding its reaches to serve future Bay Area travel demand.

We received plenty of help along the way –

- Technical review and direction was provided by a regional rail steering committee, comprised of local passenger and freight rail operators, including Caltrain, BART, Capitol Corridor, Altamont Commuter Express (ACE), Sonoma-Marín Area Transit District (SMART), Caltrans Division of Rail, and Union Pacific Railroad and BNSF Railway, along with the county congestion management agencies and the Transbay Transit Center Joint Powers Authority and Port of Oakland. In addition to Steering Committee meetings, the passenger and freight rail operators were consulted at key milestones throughout the study effort.
- An advisory group of academics, environmentalists, and business people also offered their technical expertise.
- Our neighboring regional agencies and county government associations such as Sacramento Area

Council of Governments (SACOG), San Joaquin Council of Governments (SJCOG), Transportation Agency for Monterey County (TAMC), and Santa Cruz County Regional Transportation Commission (SCCRTC) helped us to broaden our scope and consider interregional rail travel and connectivity beyond our nine-county borders.

- Stakeholders and the general public became involved early in the study effort through a series of rail visioning workshops conducted in late 2005 wherein they helped us to brainstorm about possible extensions of existing service and new rail routes. Stakeholders also provided their input through the regional rail steering committee meetings that were open to the public and will continue to do so through the community outreach workshops occurring in summer 2007.

4.2 Study Goals and Objectives

The Regional Rail Plan represents a vision of an integrated and interconnected system of passenger rail improvements and expansions for the Bay Area. The four elements of regional rail are rapid rail transit (BART), railroad-based services, high-speed rail services, and freight rail.

The plan's network and services are intended to:

- Address the combined challenge of moving people and goods;
- Provide people with a link to commercial, employment, and residential centers;
- Expand capacity for goods movement to support the regional economy;
- Serve as the backbone of an integrated regional transit network with seamless connections at key transit hubs to local transit services;
- Accommodate development of statewide high-speed rail, enable the operation of regional services along high-speed rail lines, and vice versa;
- Identify policies and incentives to encourage local governments to create well-designed, walkable communities with a mix of services near transit; and,
- Explore a governance structure that can develop regional system improvements and deliver coordinated, customer-oriented services.

4.3 Study Scope

The Regional Rail Plan effort was organized into three distinct study phases, as described below:

Phase 1 – Visioning: Kick-start study effort by brainstorming possible extensions of existing service and new rail routes through stakeholder and public outreach workshops. Define vision statements to help identify candidate rail options for consideration in study alternatives.

Phase 2 – Vision-Based Alternatives Development & Analysis: Using vision statements, identify distinct conceptual alternatives for three regional rail outcomes (regional rail only, regional rail with high-speed rail entry from east, and regional rail with high-speed rail entry from the south). Refine study alternatives in response to technical input and feedback from passenger and freight rail stakeholders on initial conceptual alternatives. Refine study alternatives with high-speed rail upon evaluation of regional rail only alternative and ridership analysis of high-speed rail options. Conduct analysis that takes into account engineering feasibility, cost, ridership, and operational, environmental and implementation issues.

Phase 3 – Draft/Final Plan: Prepare draft and final plans identifying regional and high-speed rail extensions and services for the near-, intermediate- and long-terms.

5.0 STAKEHOLDER AND PUBLIC OUTREACH - WHAT WE HEARD

5.1 Stakeholder Outreach Messages

In October 2005, a week-long planning charrette with passenger and freight rail operators and other stakeholders were conducted to brainstorm some initial planning guidelines.

Ten themes emerged as common planning principles, as follows:

- Develop a visionary rail plan for the next 50 years
- Respect existing rail service improvement plans
- Think like a passenger—ensure convenient, efficient service
- Connect transit and trains
- Offer adequate capacity
- Separate conventional freight and passenger services
- Use proven technology
- Incorporate cost-effective solutions
- Develop a comprehensive funding plan
- Transportation and land use are linked

5.2 Public Outreach Messages

Fall 2005 – Visioning Workshops

In late November/December 2005, MTC, Caltrain, BART, and the CHSRA conducted an extensive public involvement

program to engage the public in thinking about what the Bay Area rail system should look like in 2050, and more specifically, as a first step, what issues, alternatives and screening criteria should be considered as part of the study.

These public visioning workshops/scoping meetings were conducted in Oakland, San Jose, San Francisco, Livermore, Modesto, San Carlos, Suisun City and Santa Rosa. The workshops served double duty as official public scoping meetings for the CHSRA's environmental process for the Bay Area to Central Valley High-Speed Train Program. Large crowds of over 500 participants voiced a wide range of interests and ideas about how to expand the rail network.

Looking across all the comments received during this outreach effort, including written and email correspondence, the following points summarize the key messages from the public. These messages reflect the predominant opinions expressed, however, in most cases, participants voiced opinions reflecting the opposite point of view.

- Connectivity between transportation modes (rail-to-rail and rail-to-bus/ferry/other transit/bicycle/pedestrian), and to other regions is extremely important to ensure reliable, convenient travel across the Bay Area and neighboring regions. Participants expressed the need for buses, shuttles, and other options for going the first or last mile from rail stations.

- There were split opinions on whether the proposed high-speed train system should enter the Bay Area via Pacheco Pass or Altamont Pass.
- New rail routes and stations should be built along major travel corridors and high-density areas, and surrounded by transit-oriented developments, including affordable housing.
- Preserving and acquiring right-of-way for rail are high priority action items to be pursued immediately. Consideration should be given to utilizing existing rights-of-way when possible.
- Freight and passenger service cannot share tracks for much longer. Both need their own set of tracks to avoid conflicts and service delays. The large amount of freight that moves between the Bay Area's ports and the Central Valley significantly impacts our freeways, particularly I-580.
- Accessibility and rail service connections in low-income minority areas should be maximized; however, community disruption and displacement should be minimized when acquiring rights-of-way and constructing new rail lines.
- The concept of "one system, one ticket" via a regional fare system and a universal fare card was suggested to ensure seamlessness in the regional transit system.
- Bay Area transit agencies were encouraged to communicate and coordinate amongst themselves, to refrain from competition, and when warranted, to consider consolidating for cost and efficiency purposes.
- Advanced rail technologies should be applied wherever possible. Although caution was expressed by those who prefer the use of proven technologies.
- A new Bay crossing for rail should be revisited to accommodate new regional rail or high-speed rail service.
- Numerous ideas were suggested on how to improve and expand BART, Caltrain, Capitol Corridor and ACE services, including: BART extensions to San Jose and Livermore (with some opposing such extensions); Caltrain electrification and extension to San Francisco, Gilroy and beyond; ACE track separation from Union Pacific and extension to Modesto; and Capitol Corridor upgrades and extension to Reno.
- Participants rated "maximize rail transit connections and accessibility" as the most important evaluation criterion to be used during the screening and evaluation of rail project ideas. The "maximize ridership/revenue potential" and "maximize service to and promotion of transit-oriented development" evaluation criteria were also rated high.
- Participants overwhelmingly agreed that transit-oriented developments make sense for the Bay Area, their communities and for themselves.

These themes and input from rail stakeholders and public workshops provided the basis to generate rail alternatives and evaluation criteria to test those alternatives.

Summer 2007 – Response to Draft Plan

In August 2007, a series of regional rail workshops were held to receive public comments on the Draft Report Summary, which was first presented and reviewed by Steering Committee in July 2007. Public workshops were held in five locations in four counties. In four of the locations, both an afternoon and an evening session were held. A total of nine workshops were held in Oakland, San Jose, Livermore, Suisun City and San Carlos. At the public workshops the participants were given an overview of the draft plan and had the opportunity to get questions answered and provide comments on the draft plan to the study partners.

A variety of methods were used to inform the public about the workshops. This included:

- Media advisory issued by MTC on Aug. 8, 2007.
- Direct Mail: Approximately 6,000 postcards announcing the workshops were mailed on August 3, 2007, to MTC's contact database and to names from the California High Speed Rail Authority's database.
- Web Postings: Information about the Regional Rail workshops was posted on MTC's Web site and the Regional Rail Plan public Web site (www.bayarearailplan.info).
- E-mail blast: An email blast announcing the dates and locations of the public workshops was sent to approximately 5,000 email addresses extracted from MTC's contact database of public agencies, organizations and individuals; and to addresses in the Regional Rail Plan study database.

- Flyers: During the week of August 6, 2007, four rail operators distributed postcards announcing the workshops to their passengers. Altamont Commuter Express (ACE) distributed 2,000 workshop postcards and Caltrain distributed 8,000 workshop postcards to their commuters via a "seat drop." Capitol Corridor also distributed 1,000 workshop postcards to its commuters. Additionally, some 50,000 copies of a special BART Bulletin were distributed at all 34 BART station fare gates starting in early August 2007.

The key messages heard during the August 2007 workshop series included the following:

1. There was general support for regional rail and high-speed rail. Rail was viewed as key to reducing congestion, improving air quality, and providing quality transit service for the region.
2. Most supported either Altamont Pass or Pacheco Pass for high-speed rail entry from the Central Valley into the Bay Area, and some supported the idea of pursuing both alignments over the longer term. Regional overlays on the high-speed rail system received considerable support overall. There were questions about what entity makes the final decision about the high-speed rail alignment (answer: California High-Speed Rail Authority).
3. There was skepticism about a few proposed rail alignments due to geography or other reasons, and alternative rail alignments were suggested. A few participants voiced opposition to any disruption of Niles Canyon in Fremont.
4. Rail improvements are needed sooner rather than later!

5. Rights-of-way must be secured now for future passenger rail service.
6. More and faster service on ACE, Caltrain, Capitol Corridor are needed to serve today's and future travel demand.
7. Many supported rail connections across the Bay as well as across bodies of water into Marin/Sonoma and into Solano County.
8. Building a system that provides improved mobility all day long and not just during commute hours was viewed as important.
9. Potential impacts to local areas/neighborhoods, particularly due to growth in freight rail, must be addressed and mitigations identified soon.
10. Grade separations must be pursued for safety reasons.
11. There must be separate tracks for freight and passenger rail service in order to improve train operations, service levels and reliability of passenger rail service and enable the rail mode to compete successfully with cars. Passenger rail should have its own dedicated tracks, and the freight interface should be eliminated.
12. Connectivity between stations and schedules is crucial. Transfers/connections must be fast, efficient, user-friendly. Rail stations should be served with buses; payoff will be increased ridership on rail systems.
13. Station area planning must occur to make stations more than just a train stop; i.e., look at land use; have housing or job thresholds for stations.
14. How will the proposed rail network be funded? What are the potential funding sources, and what will the process be to take the plan recommendations towards implementation?
15. A policy discussion on whether to invest public funds in privately owned railroad systems is needed.
16. A single body/agency to govern rail interests, including connectivity, fare coordination, wayfinding signage, etc., must be established. How will we get the nine Bay Area counties and the Central Valley to cooperate in order to implement this plan? Partnerships among rail operators, congestion management agencies, transit operators, Caltrans, and local jurisdictions are critical to the fulfillment of the Regional Rail Plan.

Technical comments raised during the workshops have been incorporated into this report where appropriate.

6.0 Study Issues, Opportunities and Strategies

6.1 Planning Context

The Bay Area's existing and future geography and land development, rail infrastructure and growth and travel patterns interact to create the context within which planning for the regional rail system will occur. Our mountains, bays and rivers limit the number of feasible rail corridors through which both passenger and freight rail traffic can move. Our geography and development patterns have left unfulfilled connections between rail systems. Past policy decisions have resulted in several independent rail entities that currently operate and manage the Bay Area's rail services. The challenges of growth and climate change call for stronger efforts to coordinate land use and transportation. The proposed statewide high-speed train system brings exciting possibilities along with complex unresolved implementation issues.

Common opportunities and constraints that must be addressed by all metropolitan areas that want to improve their rail system include:

- Coordinating service schedules so that riders can transfer between routes quickly
- Preserving rights-of-way for future rail use
- Obtaining access for passenger trains to use tracks owned by freight railroads

- Accommodating demand for passenger and freight services within the same corridor
- Funding the significant capital, operating, and maintenance costs of rail infrastructure improvements

The Bay Area's rail system currently faces many challenges:

- Lack of coordination and connectivity between rail providers, as well as rail and local transit services, making travel on the existing rail system challenging and inconvenient for many people.
- Significant capacity constraints on the two major regional rail services – BART and Caltrain, and significant funding needs for BART's seismic retrofit program, long-term maintenance programs and "core capacity" improvements.
- Capacity limits for rail operators that share their tracks with private freight service, including Capitol Corridor's service from Sacramento to Oakland and San Jose and ACE's service between Stockton and San Jose, which experience frequent delays due to increased freight activity and have few available slots to operate more trains.
- Disjointed institutional arrangements and governance structures that limit the ability to integrate and coordinate services.
- A complex fare system that is not integrated between operators.

The issues, opportunities and strategies to be addressed by the Regional Rail Plan can be grouped into three broad categories, and are discussed in more detail below:

- **Rail System:** passenger rail technology, line capacity, physical connections, and schedule coordination
- **New and Growing Rail Services:** the BART system, high speed rail, and short-haul freight
- **Policy and Implementation:** right-of-way preservation, land use integration, governance, and funding

6.2 Rail System

Passenger Rail Technology

There are several types of rail passenger vehicles in use in the Bay Area. These include trolley/cable cars in San Francisco; light rail vehicles (LRVs) in San Francisco, San Jose, and Sacramento; heavy rail metro used by BART; and diesel locomotive hauled passenger coaches operated by Caltrain, ACE, Capitol Corridor, and Amtrak San Joaquin.

As we look to the future, there are several modern rail technologies, currently available and under development around the world, that could be applicable in the Bay Area:

- Self-propelled diesel multiple units (DMU), which have the flexibility to operate as part of a longer conventional train, as well as a single unit. Operating economics favor DMU technology for trains of up to

three cars in length. Diesel locomotive hauled trains are more economical for longer trains.

- If electrification is available, motive power for can be provided by electric locomotives. Dual powered locomotives can also be used, to avoid changing power units for operation on non-electrified territories.
- Multiple units and unpowered coaches are both available in bi-level and single-level configurations. The best type must be evaluated in the context of market demand and other factors.
- Potentially the most advanced vehicle type is an Electric Multiple Unit (EMU) train composed of self-propelled units coupled together, sometimes including non-powered “trailer” cars in the consist. Caltrain recently, as part of its Vision 2025 plan, adopted the concept of electrification using bi-level EMU technology.

So-called “lightweight” technologies such as EMU’s and DMU’s are not always available or applicable in the United States. Presently, passenger equipment which operates in mixed flow with freight trains must meet the crash worthiness standards set by the Federal Railroad Administration (FRA), as codified in 49 CFR, Part 238. Under certain specific scenarios, the FRA may allow operation of non-compliant vehicles, such as lightweight cars typically used by High-Speed Trains (HST).

Alternatively, where a line is passenger-only, or where freight traffic is temporally separated (e.g., freight trains may operate at night when there is no passenger service or where certain

tracks can be dedicated to freight movements) lightweight equipment may be utilized. The advantage of using lightweight equipment, especially in conjunction with electrification, is greater rates of acceleration and higher top speeds along with lower energy consumption.

Under current US regulations, in order for a line to be modified from standard, FRA-compliant equipment to one that operates with non-compliant, lightweight equipment, all of the vehicles must be replaced with lightweight units. This contrasts with European practice in which a mix of light and heavy passenger equipment as well as freight traffic is operated on the same line with reliance on the signal system to prevent collisions.

There are a number of efforts such as the BNSF Electronic Train Management System (ETMS) recently approved for demonstration deployment by the FRA, to develop and deploy advanced signaling systems in the US. Potentially with a signal system upgrade to provide “Positive Train Control” (PTC) systems – e.g., integrated command, control, communications and information systems potentially incorporating “moving block signals” (which do not require fixed wayside displays) and automatic train stop features to force a train which passes a restrictive signal to come to a halt, the FRA may issue “waivers” to allow deployment of lightweight passenger equipment on a demonstration basis, and may ultimately revise its policies.

Regardless of whether current FRA codes remain in effect or whether the codes are ultimately revised, there are other reasons to separate freight and passenger traffic, not the least of which is the fact that the trains operate at different speeds and have significantly different lengths. Therefore, for the purpose of the Regional Rail Plan, mixed flow of standard and

lightweight equipment is not considered as an option for the ultimate configuration of a line. However, use of waivers and demonstration projects may provide a means for upgrading a line from standard to lightweight equipment over time, without the need for an overnight replacement of all of the rolling stock.

Line Capacity

The actual capacity of a rail line depends upon several factors. Physical characteristics are important, such as the number of main line tracks, the length and location of sidings and crossovers to allow trains to by-pass or overtake, and the signaling system. But capacity also depends upon the type of train operation which is being served. For example, a slow-moving short freight train which is picking up or setting out cars may block or occupy a main line for as much or more time than would be required to accommodate an 8,000 foot transcontinental freight train.

Strategies to increase rail line capacity to accommodate growing freight and passenger services include:

- **Shared Operation** – The advantage of shared operation is the ability to incrementally expand passenger services from low levels initially to higher levels over the longer term while limiting investments in trackage to that which is minimally required to accommodate the total traffic mix. With high levels of investment, high levels of traffic can be accommodated. At the highest traffic levels, four tracks are required; at this point in the development of the infrastructure, the line essentially operates with separate passenger and freight tracks although the physical plant can still accommodate inter-operation of all trains on all tracks. Under current FRA standards,

passenger equipment must be designed to higher crash resistant standards resulting in slower rates of acceleration and deceleration, even if the passenger line is electrified.

- **Separate Operation** – Regardless of traffic levels, passenger equipment is operated on separate tracks thereby allowing use of lightweight passenger equipment capable of improved acceleration and speeds with lower energy consumption. The typical line segment is a two-track passenger main line, but if traffic levels are very low, a single line with passing sidings may be sufficient. Low levels of freight traffic can be accommodated by nighttime operation. Moderate to high levels of freight traffic can be accommodated by provision of one or two freight tracks. When passenger traffic is very high, a three and four track passenger main line may be needed to support express and local trains.
- **Grade Separation** – Grade separation may be required due to train speeds, the character of train operations versus highway traffic, or by number of tracks. Criteria include:
 - **Numbers of Tracks** – Three track sections are usually grade separated and four tracks require grade separation due to requirements of the California Public Utilities Commission.
 - **Train Speeds** – The FRA has issued an order limiting train speeds to 87 mph on the Northeast Corridor for at-grade crossings and has set a maximum speed of 95 mph for grade crossings with specialized protection systems. For planning

purposes, grade separation should be assumed for operation at speeds exceeding 90 mph.

- **Traffic Levels** – Grade separations may be warranted due to traffic impacts where high roadway volumes interact with large numbers of slower-moving, long freight trains, or because high overall levels of rail traffic result in crossing gates being down for a long time.
- **Electrification** – Electrification is desirable for a variety of reasons including:
 - **Train Speed and Acceleration** – Electric propulsion provides high torque and can be applied to multiple train axles resulting in higher rates of acceleration and deceleration, and higher top speed compared to conventional diesel locomotive driven consists. This feature is desirable for high-speed track segments and for track segments with high traffic levels.
 - **Tunnel Sections and Subways** – Electric propulsion reduces the ventilation requirements for underground or covered track sections.
 - **Land Use Compatibility** – Electrically propelled trains are good neighbors, with lower emission and noise levels.

Table 6.2-1 summarizes the main line track configurations needed to support various levels of freight and passenger traffic.

Table 6.2-1: Main Line Track Configurations vs. Freight and Passenger Traffic Levels*

	Low Freight Traffic	Moderate Freight Traffic	High Freight Traffic
Low Passenger Traffic Infrequent commuter or intercity rail service	<ul style="list-style-type: none"> Configuration #1 – Shared operation of freight & passenger on single track with passing sidings. 	<ul style="list-style-type: none"> Configuration #1 – Shared operation of freight & passenger on single track with passing sidings 	<ul style="list-style-type: none"> Configuration #2 – Shared operation of freight & passenger on line with two main tracks. May require grade separation due to freight traffic.
Moderate Passenger Traffic Frequent passenger rail service throughout the day	<ul style="list-style-type: none"> Configuration #3 – Two track passenger line with option for night freight May be electrified and/or grade separated if high speeds or traffic levels present. 	<ul style="list-style-type: none"> Configuration #4 – Shared operation with three main tracks (2 passenger + 1 freight) Configuration #6 – Separate operation with 2 passenger tracks and 1 freight track May require grade separation due to highway traffic levels. 	<ul style="list-style-type: none"> Configuration #5 – Shared operation with four tracks (2 passenger + 2 freight) Configuration #7 – Separate operation with 2 passenger and 2 freight tracks Requires full grade separation due to number of tracks and freight traffic level.
High Passenger Traffic Mass transit level of passenger rail service typically using lightweight equipment	<ul style="list-style-type: none"> Configuration #8 – Three or four track passenger line with option of night freight Usually fully grade separated due to number of tracks and speeds. May be electrified due to traffic densities and/or speeds. 	<ul style="list-style-type: none"> Configuration #5 – Shared operation with four tracks (2 passenger + 2 freight) Configuration #7 – Separate operation with 2 passenger and 2 freight tracks Requires full grade separation due to number of tracks and freight traffic level. 	Special cases requiring site specific study.

*Applicable to regional rail without high-speed rail.

Figure 5 provides a line-by-line evaluation of the various rail routes in Northern California along with a general characterization of the traffic levels.

High density corridors, shown in red, are those proposed for major growth either in freight traffic and/or passenger traffic, possible electrification, use of electrified and possibly non FRA compliant passenger equipment. These are potential four track corridors, with freight and passenger trains operating on separate exclusive use tracks. Corridors that either fit in this category today or are forecast to reach this status in the future include: Sacramento to Oakland, Oakland to San Jose, Sacramento to Merced, and San Francisco to San Jose.

Medium density corridors (blue) are those with mixed freight, regional commuter operations and long distance Amtrak trains, which use compliant equipment and are not expected to be electrified. Corridors in this category include: Auburn to Sacramento, Merced to Martinez, Tracy to Martinez, Niles Junction to Stockton, Redwood Junction to Newark, and San Jose to Salinas.

Low density corridors (green) are those with either minimal freight or low passenger use, usually offering only peak hour passenger service, possibly only one direction in the morning and the other direction in the evening. This type of corridor will have freight with non-electrified regional commuter operations. These corridors include: The SMART Corridor, Ignacio to Fairfield/Suisun, St. Helena to Vallejo, Tracy to Los Banos, Santa Cruz to Pajaro/Watsonville Junction, Castroville to Monterey, and Carnadero (south of Gilroy) to Hollister.

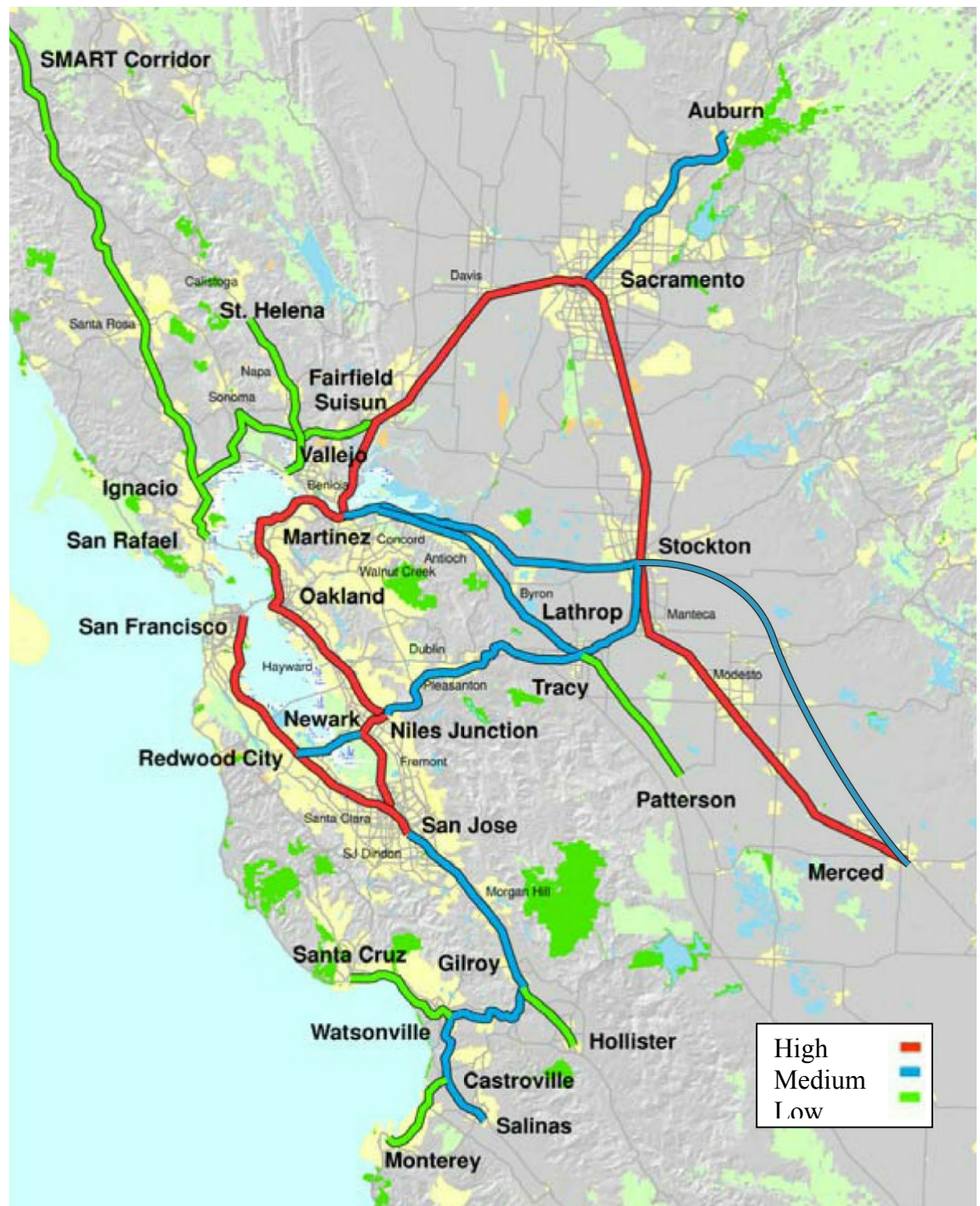
The high density lines are all at or approaching capacity under existing traffic in their present-day configurations. As a result,

significant investment in additional main line tracks as well as operational improvements (e.g., crossovers, sidings and signals) will be required by the Year 2050. Even if no additional regional passenger services were provided, the growth in freight traffic on principal lines such as the UPRR Martinez Subdivision north of Port of Oakland will require capacity investments.

For the Capitol Corridor service to continue to expand and meet the needs of projected customers, investments to the route between San Jose and Oakland, as well as further north from Oakland to Sacramento and beyond will be required. Operational factors need to be taken into consideration. For example, conventional class track supports operation up to 79 mph with an at-grade solution. Above 79 mph, however, the UPRR will not provide dispatching. Therefore, for the Capitol Corridor to operate at 90 mph, separate dispatching of the passenger trackage would be required, even if the equipment is standard weight and FRA-compliant.

Additionally, in order for the Caltrain service to reach traffic levels proposed in its long range plan, as well as accommodate Dumbarton trains on the Peninsula, three or four main tracks will be required for the entire length of the Peninsula.

Figure 5
System 2007 Traffic Density



Physical Connections

A basic requirement for a well-integrated rail system is provision of physical connections between routes. MTC's 2006 Transit Connectivity Plan calls for the clear delineation of major multimodal transfer hubs and development of additional hubs. Connection points are truly multimodal. At several locations, ferries or regional bus routes will be connecting to regional rail services, providing a regional link where travel volumes do not justify a rail investment. Local bus and rail services should be continually adjusted and upgraded in response to regional rail improvements and new services.

Key points of existing and future rail, bus and ferry connectivity are listed below, with major connection points in **bold**:

- San Francisco (4th / Townsend) – Caltrain, MUNI light-rail, future High-Speed Rail
- **Transbay Transit Center** – Regional Bus, MUNI bus, future BART, Caltrain and High-Speed Rail
- Richmond – Capitol Corridor and BART
- Martinez – Capitol Corridor and Amtrak San Joaquin long haul trains
- **Sacramento** – Capitol Corridor, Sacramento Regional Transit, Amtrak long haul trains, future High-Speed Rail
- Stockton – ACE and Amtrak San Joaquin long haul trains, future High-Speed Rail
- MacArthur BART – Richmond / Fremont and Pittsburg Bay Point / Daly City lines
- Bay Fair BART – Richmond / Fremont and Dublin Pleasanton / Millbrae lines
- Oakland Coliseum – Capitol Corridor, BART and future Oakland Airport Connector and High-Speed Rail
- Fremont (Centerville) – Capitol Corridor, ACE, future Dumbarton Rail and High-Speed Rail
- **San Jose** – ACE, Caltrain, Capitol Corridor, VTA light rail, and future BART and High-Speed Rail
- Millbrae – Caltrain and BART including connection to SFO, future High-Speed Rail
- Larkspur – SMART and Ferry Services
- Napa Junction – North Bay regional rail services
- Fairfield / Vacaville – Capitol Corridor and North Bay regional rail services
- 65th (Sacramento) – ACE and Sacramento Regional Transit light-rail
- Hercules – Capitol Corridor and Ferry Services
- **West Oakland** – BART, future Capitol Corridor, Amtrak San Joaquin long haul trains and High-Speed Rail
- Oakland 12th Street BART – Cross platform transfer between Pittsburg – Bay Point / Daly City and Richmond – Fremont lines
- Livermore – future BART, ACE and High-Speed Rail
- Union City – BART, Capitol Corridor, future Dumbarton Rail and High-Speed Rail
- Tracy – ACE, future eBART extension, West Side rail and High-Speed Rail
- Castroville & Pajaro – future Monterey / Santa Cruz service and Salinas / San Jose service
- Santa Clara – Caltrain and future ACE, BART and SJC airport connector
- Redwood City – Caltrain, and future Dumbarton Rail and High-Speed Rail

The future regional rail network would be based upon existing transit systems, and today's connectivity points would continue in that function in the future. However, modifications to and expansion of the regional rail network would require some relocation of connectivity points and restructuring of local and regional bus routes. Connectivity points of regional significance are often located at the terminal stations of rail lines. At these points, buses reaching a wider service area feed into the rail network. As this network expands and new stations serve as terminals, these stations will assume the role of connectivity points. Furthermore, the expansion of the rail network into areas currently not served would call for the reorientation of bus routes to feed into the new rail stations and avoid duplication of service.

Regional connectivity points need to be designed with transferring passengers in mind. Cross-platform transfers, or transfers that involve a simple change in level, are typically facilitated within rail stations. Transfers between rail and bus, however, are often less convenient and may require leaving/entering a station and a walk between rail platforms and bus stops. Passengers with disabilities in particular may face considerable obstacles when transferring. Thus, the paths of transferring passengers at regional connectivity points should be minimized and enhanced with straightforward signage and dynamic information systems.

Physical connections between rail systems can be classified by their configuration. These principles also apply to connections between rail and local and regional bus transit, as well as to local connecting light rail services. Four general configuration types are described below, in order of decreasing passenger convenience:

- **Cross-platform transfer:** for this transfer, passengers get off one vehicle and transfer to another on the opposite side of the same platform, or board a vehicle that arrives later on the same side of the platform or at the same stop.
- **Direct vertical connection:** this transfer involves a minimal or no horizontal component, only a change in levels.
- **Concourse connection:** similar to the direct vertical connection, the transfer takes place within an “indoor” environment (though it may be open to the elements). The paths of transferring passengers do not cross streets, though they typically include passage through concourses, halls, or other passages (a horizontal component) and changing levels (a vertical component).
- **Extended walk or shuttle connection:** in this situation, a platform or stop may be located several blocks away from a corresponding platform or stop. Transferring passengers typically must move from an indoor to an outdoor environment, or vice versa. The transfer may involve crossing streets or taking a short ride on a shuttle bus or peoplemover in order to get from one to the other.

Where feasible, rail alignments should allow for cross-platform or direct vertical transfers to provide the highest degree of physical connectivity.

Schedule Coordination

Convenient physical connections can be further enhanced by schedule coordination of rail and transit services. Schedule adherence is a cornerstone to achieving the benefits provided by coordinated schedules. The following rail improvement strategies support schedule reliability:

- Improved signaling systems, allowing trains to operate at closer spacing and at higher speeds
- Crossovers and sidings to allow faster trains (typically carrying passengers) to pass slower trains (generally freight runs)
- Adding additional track to address capacity shortfalls
- New alignments to allow faster speeds
- Grade separations

There are three principal types of schedule coordination that are applicable to regional rail service in the Bay Area, and the local transit services that connect to it:

- **Pulse Schedules:** At a station or stop with a pulse schedule, rail and/or bus transit lines converge at regular intervals at a hub and wait for 3 to 5 minutes during which transfers can be made. A *simultaneous* pulse schedule includes all lines serving the station at each “pulse”, while a *staggered* or *alternating* pulse schedule includes only certain lines operating in different patterns. For example, less frequent lines would skip every other pulse. (Headways on the transit routes need to be evenly divisible; e.g. 10 and 20 minutes is good, 15 and 20 minutes is bad.) Pulse schedules can be implemented for local transit routes serving regional rail and BART stations where base headways are greater than 15-20 minutes. In some cases, the pulse concept can be applied between regional rail

services themselves. During off-peak hours, BART trains pulse at MacArthur Station to facilitate transfers in all directions. Napa Junction is a stop option in the Regional Rail Plan where two low frequency rail lines would cross; trains could be scheduled to arrive within short intervals, during which they would be held to allow transfers to take place. San Rafael, Stockton, Modesto and Pajaro/Castroville are other locations that could benefit from rail-to-rail pulse scheduling.

- **Directional Schedule Coordination:** At stations where directional scheduling is implemented, local services are scheduled to “feed” the line-haul rail service in the peak direction of travel. For a traditional morning commute trips to downtown, local transit services would be scheduled to arrive at the rail station about 3-5 minutes before the train to downtown was scheduled to depart. In the evening, local transit would be scheduled to leave 3-5 minutes after the train from downtown arrived. Note that at any specific time of day, this scheme affords convenient transfers only in one direction of travel; transferring passengers in the opposite direction of the coordinated schedule would face longer waits. Station options in the Regional Rail Plan where directional schedule coordination may be desirable include: Sacramento, Fairfield/Vacaville, Richmond, Union City, Centerville, Irvington, San Jose and Tracy. Direct schedule coordination could also be beneficial at regional rail stations served by light rail, such as: Bayshore (Muni Metro); Mountain View, Great America, Capitol, I-880/Milpitas (VTA light rail); University/65th (Sacramento RT).

- **Dependent Linked Schedules:** This type of coordination applies where one route acts as the continuation of another terminating service. When one transit vehicle arrives, the second vehicle is having a layover and can immediately receive transferring passengers. This requires high reliability on the part of both services and delays on one line would affect service along the line in the forward direction of travel. The following connection points are candidates for dependent linked schedules: Pittsburg/Bay Point, San Rafael, Larkspur, Saint Helena, Vallejo, Livermore, Gilroy, and Pajaro/Castroville.

6.3 New and Growing Rail Services

The BART System

A unique part of the Bay Area's urban fabric, the existing BART system is a hybrid providing long distance regional rail service and short-distance urban metro or subway service. In Downtown San Francisco and Downtown Oakland, BART stations function and are spaced like metro or subway stations in any other major city. Yet at the outer ends of the system, stations function and are spaced like those of commuter rail systems in other cities. BART currently carries the greatest number of passengers of all the Bay Area rail system, by far. The system is facing a highly congested Transbay corridor, which is only going to get more crowded. In several areas, there is strong community interest to add "infill stations" between existing stations to better serve local neighborhoods or support transit-oriented development efforts. In addition, there are long-standing concerns from residents and policymakers in the outer parts of the BART District about obtaining service to areas not currently reached by BART tracks. What should BART become in the next 50 years? Should it expand outward, emphasizing its regional rail characteristics? Or should it focus on the urban core, becoming more like a metro or subway system?

High-Speed Rail

California is pursuing implementation of a statewide High-Speed Train (HST) system for intercity travel between the Bay Area's major cities, through the Central Valley, to Sacramento, Los Angeles, Orange County, and San Diego. The HST system is projected to carry up to 117 million passengers annually by 2030 and will be able to travel more than 200 miles per hour on a fully grade-separated track, with state-of-the-art safety, signaling, and control systems. A trip from

downtown San Francisco to downtown Los Angeles will take about 2.5 hours.

Planning for the HST began 10 years ago and the California High-Speed Rail Authority has adopted a business plan and completed much of the environmental review for the plan. The pace of planning is picking up with a likely ballot initiative on in the November 2008 statewide ballot to fund construction of the first phase of the project.

While the vast majority of the statewide route has been chosen, the largest remaining question is how the train would enter the Bay Area, from the east through Livermore or from the South through Gilroy and San Jose. Because the high-speed rail alignment has not been adopted and the project is not funded, this Regional Rail Plan considers four HST alternatives --no HST, a southern alignment, an eastern alignment, and even a fourth option for HST over both southern and eastern alignments.

Short-Haul Freight

Foreign trade is a cornerstone of California's prosperity, with significant imports and exports in the San Francisco Bay Area and Central Valley. Transportation of international containers between the Central Valley and the Port of Oakland is Northern California's lifeline to foreign markets, but that lifeline is threatened. If exporters must rely on increasingly congested freeways to move their goods, both their ability to compete and the region's ability to grow will be jeopardized. If importers must rely on those same freeways, they will locate elsewhere.

Furthermore, regional planners, congestion management agencies, and regional air quality management districts are all interested in reducing highway congestion and improving air

quality by shifting freight presently moving by highway to the regional rail network. At the same time, there is a major emphasis on reducing auto traffic by increasing use of the regional rail network to move significantly more rail passengers, particularly during peak commute hours.

As a result, there is a potential conflict between increased use of the freight rail network for passenger rail initiatives and increased use of the regional rail system to divert highway truck traffic. The question to be answered is: how can short-haul freight be incorporated into a regional railway system where long haul freight is growing significantly and where there is also a desire and need for use of the same network to expand regional passenger service at the same time? Stated differently, how can short haul freight be incorporated into the regional rail system in the most innovative and least costly manner?

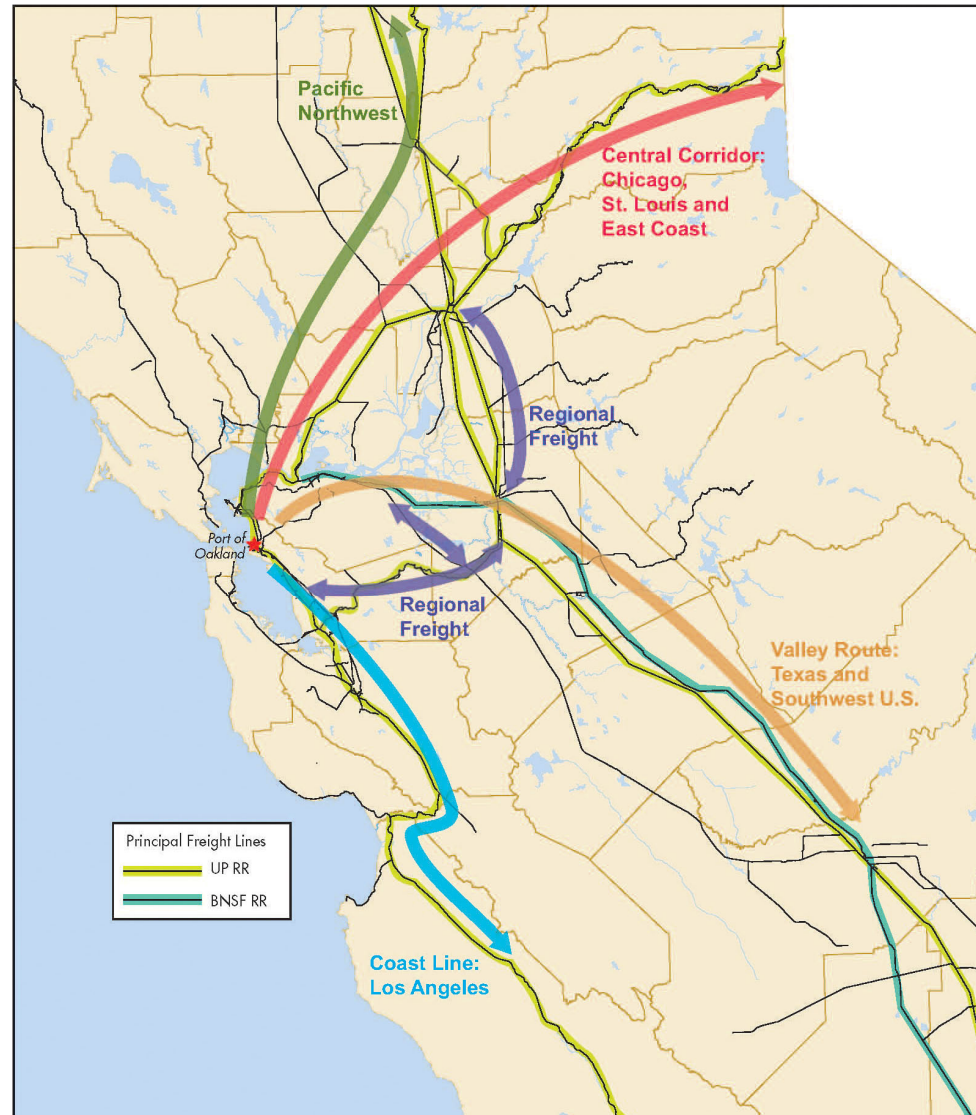
The California Inter-Regional Intermodal System (CIRIS) study from June 2006 is envisioned as an umbrella concept for rail intermodal service between the Port of Oakland and the Central Valley. Inland intermodal facilities served by rail shuttle operations offer potential solutions to Northern California's looming need for better trade lifelines to San Francisco Bay Area ports. At present, there are significant movements of international containers between the Port of Oakland and numerous points in the Central Valley. Additionally, traffic is drayed over the highway network, increasing both highway congestion and emissions of air pollutants, including greenhouse gasses. If an efficient and economical way could be found to shift this container traffic to the rail network, there could be significant air quality and traffic benefits for the entire region.

Figure 6 presents a proposed short haul route using the rail trackage through the Altamont. The promise of short haul would require the following considerations:

- Capacity improvements in transcontinental freight corridors such as the Central Corridor over the Sierra Nevada and Valley Route heading to the Tehachapis in Southern California such that trackage in the Altamont route could be focused towards passenger and short haul freight.
- Evaluation of the potential to use existing minor rail routes, such as the Mococo and West Side lines, to carry short haul freight traffic
- Institutional and financial arrangements developed in a public-private context to establish and manage the operational cost of providing short haul freight as an alternative to trucking goods between the San Joaquin Valley and Bay Area ports and industries. In general, short haul freight movements require public subsidy to cover the added cost of transloading containers to and from the short haul rail network.

Figure 6

Northern California Rail Freight Traffic Corridors



6.4 Policy and Implementation

Right-of-Way Preservation

Assembly of right-of-way to accommodate new rail lines is very difficult within the built up areas in the inner core. Environmental considerations make it difficult to carve out new transportation arteries in greenfields areas. Therefore, existing rail rights-of-way regardless of the current level of use may be critical to allow for development of the rail network. All of the existing rail rights-of-way in Northern California, which could potentially support rail services over the long term, need to be evaluated; and the ultimate potential for each corridor segment identified. In the event that passenger service does not appear to be viable in the near term, these corridors should be preserved for rail use in the long-term future.

The method of preservation is also an issue. Some abandoned rail corridors have been preserved and converted to trails or paths. If a corridor is to be preserved for future rail use, it needs to be understood that development of interim uses does not preclude returning the right-of-way to an active railroad. In most cases the interim use can be retained side by side with the reinstated rail service.

A second aspect of rail preservation is retaining the ability to operate passenger trains within corridors presently owned and used by freight railroads. As both freight and passenger rail traffic grows, the public and private sector must work together to fully utilize scarce space on existing corridors.

Land Use Integration

Both MTC and BART have adopted policies that link funding for transit expansion with land use. In July 2005, MTC adopted a hallmark Transit-Oriented Development (TOD) policy for regional transit expansion projects to help improve

the cost effectiveness of regional investments. The TOD policy calls for planning housing development around new transit routes and stations. MTC provides financial incentives and planning grants to communities that do not meet the threshold.

BART policies require collaboration with communities to make investment choices that encourage and support transit-oriented development and increased transit use. BART's System Expansion Policy helps determine where new expansions will go, in part based on a commitment by the municipality to help generate new ridership with transit-supportive growth and development, as well as a high level of access by local transit, bicycle, and walking to the new station.

State and federal officials are also making the transportation and land use link. In its Final Environmental Impact Report/Environmental Impact Statement (EIR/EIS), the CHSRA identifies the benefits of increasing development densities near proposed stations. The Authority set forth principles for selecting station locations that include a preference for traditional city centers and an expectation that local governments adopt station area policies that require transit-oriented development.

Finally, the Federal Transit Administration (FTA) also evaluates the extent of transit-supportive land uses and economic development opportunities when considering funding for new transit expansion projects.

Governance

Consideration of new or expanded rail services raises opportunities to explore ways to make the regional system work more efficiently. While there is no “ideal” number of transit operators for the Bay Area, having some two dozen

separate operators clearly complicates the task of providing a seamless regional transit system. The region should seriously evaluate the benefits and costs associated with merging transit agencies and/or consolidating functions to improve cost-effectiveness and service design. Functional consolidation would pool limited funds, promote uniform fares, and provide more responsive regional service. It also offers potential economies of scale in terms of joint purchases, maintenance facilities, and marketing and customer services. Drawbacks of consolidation include perceptions that local interests may not be served and potential application of higher-wage urban labor cost structures to suburban services that currently have lower labor costs. A critical examination of the current institutional arrangements may help to illuminate common interests, potential for joint-use, financial leveraging, and operational efficiencies as well as offer alternatives to manage, operate, and govern the Bay Area's regional rail systems.

The Bay Area currently has four providers of regional passenger rail services: Caltrain, BART, ACE, and Capitol Corridor. Alternative governance structures that could be applicable to Northern California include:

- **Decentralized** – the Northern California status quo
- **Regional Federation** – such as Chicago or San Diego
- **Regional Rail Authority** – similar to the Southern California Regional Rail Authority
- **Consolidated Regional Rail** – used in New York City, Boston, Washington, D.C. and Philadelphia

As part of this study effort, two workshops were held with executives and elected officials representing Bay Area rail operators. The workshops resulted in the identification of

priority issues for improvement of the delivery of services, consideration of alternative governance models potentially applicable to Northern California, and initiatives which could be undertaken with increased coordination and funding of rail services.

Funding

The Bay Area's investments in its current transportation are substantial, and keeping it in good working order is even more so. Our existing road and transit systems face a whopping \$17 billion maintenance and operating funding gap over the next 25 years. The challenge will be to squeeze every penny and invest strategically and wisely in our network.

MTC's Resolution 3434 rail projects currently cost about \$10 billion to build. The rail projects in this plan add another \$35 billion. With limited funding, every dollar invested in rail needs to achieve the highest possible benefit. Funding needs go beyond the capital cost of rail investments to include considerable operating and maintenance costs.

By establishing a comprehensive long-range plan and identifying the total level of investment potentially required, the Regional Rail Plan can provide a target for full funding of rail transportation at the regional level. This is the first step in forging a regional consensus behind a program of projects. Such consensus is essential to advocating for and pursuing federal, state, regional and local sales tax funding, and ultimately delivering high-priority rail expansions. The regional rail funding program would need to be complemented with commensurate investments in local transit to provide a complete transit option including the "last mile" of travel to and from the rail station.

7.0 ALTERNATIVES DEFINITION & EVALUATION - STEP-BY-STEP

Figure 7

Step One: Base Network

Recognizing that Resolution 3434 represents MTC's regional rail investment over the next 25 years as adopted first in the 2001 Regional Transportation Plan and reaffirmed in the subsequent plan update, Resolution 3434 is included as part of the "base case" network. Therefore, the study effort focuses on defining options for rail improvements and expansions beyond Resolution 3434.

Resolution 3434 rail projects include:

11. BART/East Contra Costa Rail (eBART)
12. ACE/Increased Services
13. BART/I-580 Rail Right-of-Way Preservation
14. Dumbarton Bridge Rail Service
15. BART/Fremont-Warm Springs to San Jose Extension
16. Caltrain/Rapid Rail/Electrification & Extension to Downtown San Francisco/Transbay Transit Center
17. Caltrain/Express Service
18. SMART (Sonoma-Marín Rail)
19. Capitol Corridor/Increased Services
20. BART/Oakland Airport Connector



Step Two: Vision Statements

A set of vision statements was developed for each of the four elements of regional rail – rapid rail, railroad-based, high-speed rail, and freight rail services. In lieu of formally evaluating and screening the wide range of rail service options, these vision statements guided the formulation of various candidate rail service options to be considered in the study alternatives. The vision statements are intended to describe significantly different thematic approaches to the development of each study alternative.

BART

- **Core Capacity:** BART remains largely as is, with improvements focused on system renovation and core capacity needs.
- **Mass Transit (“Metro System”):** BART is not extended but infill stations are constructed and service is concentrated to provide mass transit service in dense areas with express and/or skip stop service being used to provide adequate travel times for longer length trips. Alternative technologies are used to extend coverage except where short extensions of the BART technology would provide the most beneficial solution.
- **Regional Expansion:** BART is extended and expanded beyond Resolution 3434 to become a system providing regional service throughout the Bay Area counties similar to the original BART plan.

Railroad-Based Passenger Services

- **Separate Regional Passenger Rail Network:** Rail is upgraded to ultimately provide 115 mph service operating throughout the region on separate electrified grade-separated trackage along principal line segments; passenger service is withdrawn from existing freight tracks along principal lines thereby improving capacity for goods movement.
- **Existing Passenger Services Shared with Freight Rail –** Appropriate capacity and operational improvements including signaling, passing tracks and/or multi-tracking and route alignments are constructed along shared lines to accommodate the projected increases in combined passenger and freight demand in shared freight/passenger corridors using FRA-compliant equipment with higher speeds. High-speed rail, if present, would be on separate trackage using non-FRA compliant equipment.
- **Hybrid System –** A hybrid system is pursued in which the rail solution is selected on a corridor-by-corridor basis to select the most appropriate vehicle technology and running way treatment with consideration for adjacent corridors and other systems (e.g., BART and High-Speed Rail) so that a consistent, workable systemwide plan results.

High-Speed Rail Visions

- **South Entry:** High-Speed Rail enters the Bay Area from the South through San Jose, and links are added for service to San Francisco and Oakland.
- **East Entry:** High-Speed Rail enters the Bay Area from the East via the Tri-Valley area (Livermore/Pleasanton), and

links are added to connect to San Jose, Oakland, and San Francisco.

- **Regional Overlay Services:** High-Speed Rail planning efforts would include the development of regional “overlay” services using the high-speed rail infrastructure with additional investments in facilities and compatible rolling stock necessary to support all of the proposed services.

Freight

- **Existing Freight Operations Practices** – Future freight movements are dispatched by freight railroads consistent with existing practices and improvements are made to existing freight lines to accommodate traffic growth.
- **Freight Dispatching Optimized** – Future freight movements are dispatched to optimize the utilization of regional rail infrastructure and improvements are made within existing rights of way to accommodate traffic growth needs.
- **Consolidated with Freight By-Pass Lines** – Portions of the regional rail system are consolidated under public ownership and future freight movements are controlled from a consolidated passenger-freight dispatcher center, which hands off freight trains to the private railroads at selected points of connection. Improvements are made both within existing rights of way as well as along other available rights of way to accommodate traffic growth. Freight traffic is routed away from major urban areas where feasible.

Step Three: Study Corridors

To facilitate the assembly of the study alternatives, the study area was divided up into corridors. Within each corridor, the intention is to develop alternative packages composed of consistent alignment and station options to support all of the proposed services. Later, the alternative packages could potentially be “mixed and matched” by corridor based upon the evaluation results to develop the recommended hybrid alternative.

The corridors have been defined as areas connecting between major population centers where a substantial portion of the trunk travel within the corridor is longitudinally along the defined route. To the extent possible, corridors are geographically distinct; however, they may overlap at major regional centers, in which case some of the corridor rail infrastructure may be shared between services serving multiple corridors. As shown on Figure 5, twelve corridors used in the study are:

- BART System (all lines)
- US 101 North Corridor (Marin ↔ Sonoma)
- North Bay Corridor (Marin ↔ Solano)
- I-80 Corridor (Auburn ↔ Oakland)
- East Bay Corridor (Oakland ↔ San Jose)
- Transbay Corridor (San Francisco ↔ Oakland)
- Peninsula Corridor (San Francisco ↔ San Jose)
- South Counties Corridor (Santa Cruz, Monterey, San Benito)
- Dumbarton Corridor (Redwood City ↔ Union City)
- I-680 & Tri-Valley Corridor (Contra Costa & Southern Alameda)
- Central Valley Corridor (Sacramento ↔ Merced)
- Grade Crossings and Grade Separations (all lines)

Step Four: Study Alternatives

Twelve study alternatives were identified based on the vision statements. Three study alternatives were developed for Regional Rail without High-Speed Rail Alternative:

- One alternative emphasized regional expansion for BART coupled with shared passenger-freight railroad-based services,
- One emphasized a metro system for BART coupled with separate passenger-freight railroad-based services, and
- One emphasized core capacity for BART with corridor-specific railroad-road based services and freight by-pass lines.

With additional stakeholder and Steering Committee input, the three Regional Rail without High-Speed Rail alternatives were winnowed to two alternatives, which were then subjected to further testing and evaluation.

Nine study alternatives were developed for Regional Rail with High-Speed Rail – three alternatives included different combinations of regional rail and high-speed rail services from the south via San Jose to San Francisco and Oakland; and six alternatives included different combinations of regional rail and high-speed rail services from east via Tri-Valley to Oakland, San Francisco, and San Jose. Refinements to the Regional Rail with High-Speed Rail alternatives were later refined based on the travel analysis prepared for the CHSRA’s draft environmental document for the Bay Area to Central Valley High-Speed Train Program.

Figure 8

Study Corridors

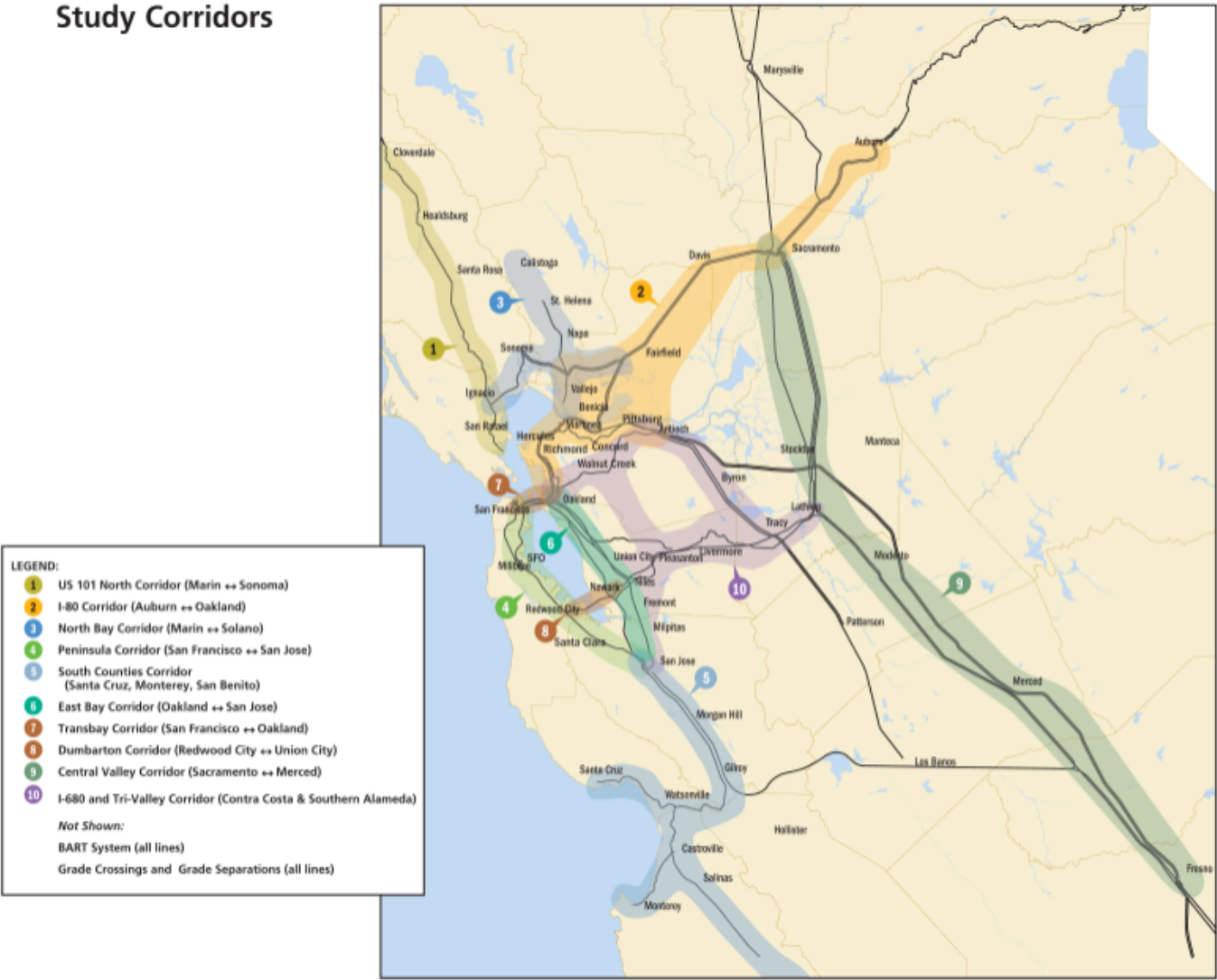


Figure 9

Study Alternative 1 2050 System Map

Legend

- HSR only, light weight equipment, double track, fully grade separated
- Regional Passenger Rail, light weight, fully grade separated
- HSR with Regional Passenger Rail
- Freight/Regional Rail
- Predominantly freight, standard equipment
- BART

- Federal Lands
- Park Areas
- Conservation Areas

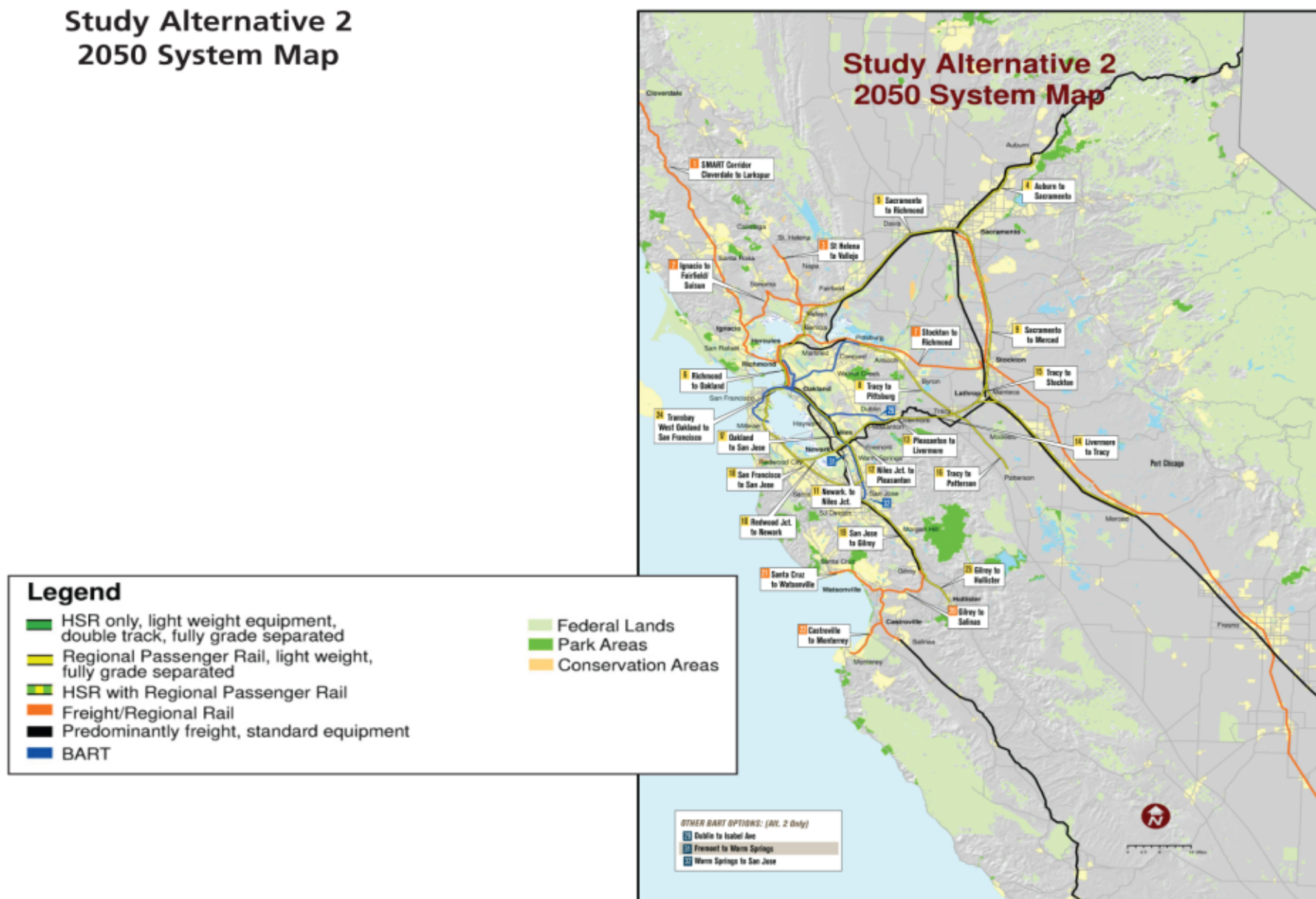
OTHER BART OPTIONS: (ALT. 1 Only)

- Oakland 4th Track
- Bay Crossing West Oakland Wye to Geary Corridor (33rd Avenue)
- Bay Crossing West Oakland Wye to Presidio
- Dublin to Greenville
- Richmond to Hercules
- Fremont to Warm Springs
- Warm Springs to San Jose



Figure 10

Study Alternative 2 2050 System Map



The final study alternatives that were identified with and without high-speed rail are as follows:

- **Existing:** Includes existing Capitol Corridor, Amtrak San Joaquin, Altamont Commuter Express (ACE) and Caltrain standard passenger rail, along with BART services; these systems currently integrate with local rapid transit to provide end-to-end mobility.
- **Baseline – Year 2030:** Encompasses MTC's Regional Transit Expansion Program (Resolution No. 3434), including nine new rail extensions and significant service expansions to existing rail lines; introduces Sonoma-Marín Rail Transit Project (SMART), Dumbarton, and eBART, as well as enhancements to the Capitol Corridor, Amtrak San Joaquin, ACE and Caltrain. It also includes BART “Core Capacity” improvements.
- **Alternative 1 – Year 2050 – Regional Rail with BART Systemwide Expansion Focus:** No high-speed rail; standard passenger rail shared with freight (capacity improvements as needed); freight dispatching optimized on shared lines; separate freight and passenger tracks on high capacity corridors; short-haul freight between Port of Oakland and Central Valley via Altamont; BART “Regional Expansion;” New BART Transbay Tube; and new San Francisco Subway. Improvements to construct this system are estimated to cost nearly \$40-billion in present day (2006) dollars. Systemwide regional rail ridership on an average weekday would reach 1.35-million riders by Year 2050.
- **Alternative 2 – Year 2050 – Regional Rail with Railroad-Based Services Expansion Focus:** No high-speed rail; lightweight passenger rail system separated from freight on

high volume corridors (higher speed, grade separated and electrified system); Transbay rail tunnel to allow extension of Peninsula electrified service to connect with East Bay; freight operating practices independent from passenger operations; and BART “Mass Transit” provider with additional stations and short extensions. Alternative 2 is expected to cost \$37-billion in present day (2006) dollars and would carry nearly 1.20-million rail passengers on an average weekday in Year 2050.

- **High-Speed Rail – Year 2050 – Entry from East via Altamont Pass:** Starting with the recommended Regional Rail network without High-Speed Rail, revisions were made to the regional network to reflect the inclusion of a high-speed alignment entering the Bay Area from the East. These revisions include the additional investment in corridors where high-speed rail would operate as well as consideration for operation of regional services operating on the high-speed lines and opportunities to accelerate improvements to regional corridors affected by the Altamont alignment.
- **High Speed Rail – Year 2050 – Entry from South via Pacheco Pass:** Starting with the recommended Regional Rail network without High-Speed Rail, revisions were made to the regional network to reflect the inclusion of a high-speed alignment entering the Bay Area from the South. These revisions include the additional investment in corridors where high-speed rail would operate as well as consideration for operation of regional services operating on the high-speed lines and opportunities to accelerate improvements to regional corridors affected by the Altamont alignment.

Step Five: Evaluation Criteria

The evaluation of the study alternatives was conducted on a corridor-by-corridor level using criteria such as engineering feasibility, capital costs, travel demand, operational impacts, connectivity, environmental, and implementation issues.

- **Engineering Feasibility:** The condition, configuration and traffic on the existing passenger and freight rail system in the Bay Area was first inventoried to provide the basis for the engineering analysis. For each study alternative, the study's technical consultants performed conceptual civil engineering of railroad track, grade and sub grade construction, incidental structures, stations and maintenance, servicing and layover facilities. Further, the technical consultants performed conceptual structural engineering with consideration for geotechnical factors for major structures, including conventional railroad and/or high-speed rail crossings of San Francisco Bay and the Carquinez Strait. Lastly, the technical consultants also performed signal and communication systems engineering and cost estimation to an appropriate level of confidence, as well as conducted an evaluation of potential for railroad electrification for each study alternative.
- **Capital Costs:** For each study alternative, the technical consultants performed cost estimation to an appropriate conceptual level of confidence of railroad track, grade and subgrade construction, including major incidental structures. Cost and environmental issues represent prominent concerns in Bay crossings, and therefore, were closely evaluated.
- **Travel Demand:** The travel forecasts used in this study to estimate ridership potential are derived from two modeling systems: (1) MTC's intraregional travel model which focuses on local highway and transit characteristics and behavior

associated with shorter-distance trips (such as commuting and shopping); and (2) the statewide interregional model developed for MTC and California High-Speed Rail Authority to evaluate high-speed rail alternatives in the state. This interregional model captures behavior for longer-distance travel including induced trips, business and commute decisions, recreational travel, attributes of destinations, reliability of travel, party size, and access/egress modal options.

- **Operational Impacts:** The technical consultants developed a "sketch plan" evaluation of capacity based upon readily available information supplemented by planning level analysis. Mainline cross sections for principal line segments were evaluated based upon the general magnitude of intended freight and passenger services to be supported. Major factors that determine capacity of rail lines include, but are not limited to: number of main tracks, location and configuration of crossovers, number of locations where trains can meet and/or pass, ability to get freight trains clear of main line tracks (passing tracks), type of signal and method of traffic control, grades and curvature, passenger train frequencies, traffic mix between freight and passenger, and so forth. Factors that tend to reduce or restrict capacity include, among others: distance between stations, ability to meet or pass trains stopped at stations largely determined by platform configuration, amount of switching activity blocking or fouling the main line tracks, locations where trains tend to queue up, capacity restrictions around yards and terminals, interchange locations, and junction points.
- **Connectivity:** Connectivity points are important to the mobility capability of the passenger and are proven to increase patronage for the overall rail network. In this vein, the technical consultants identified several locations for

connectivity among the rail networks and local transportation systems. The connectivity points provide passenger connections between two or more rail services making it easier for the passenger to reach their destination. Major connectivity stations and their potential services were identified for each study corridor. They were organized into three groups, depending on their impact and importance in terms of population served and operators present – statewide, regional, or local relevance. Schedule coordination is key to these connectivity points. In addition, the technical consultants also considered local and regional transit connections, building upon the Regional Measure 2 Transit Connectivity Study and the Transportation 2035 Plan’s Regional Express Bus Study being developed for MTC.

- **Environmental Issues:** For the purpose of the Regional Rail Plan, corridor options were screened to identify major environmental concerns. These include impacts to natural resources, section 4(f) impacts, environmental justice, and right-of-way impacts either to existing or adjacent uses. Notable environmental concerns have been identified.
- **Implementation Issues:** Consideration was given to implementation risks including consistency with existing transportation plans, existing corridor ownership and usage (including freight traffic requirements), major environmental issues that may present implementation risk, and other factors.

Step Six: Regional Rail Alternatives Evaluation

The two systemwide alternatives – Alternative 1 Regional Rail with BART Systemwide Expansion and Alternative 2 Regional Rail with Railroad-Based Services Expansion – were evaluated on a corridor-by-corridor basis taking into account the evaluation criteria described above. See Table 7.0-1 for details.

For each corridor, a recommended corridor treatment has been identified. The recommended alternative was developed based upon the evaluation factors for the services in the corridor with consideration for adjacent corridors and the overall regional rail network. In some cases, the recommended alternative consists of a blend of the two system alternatives or includes refinements suggested by the evaluation process.

BART System

BART options have been addressed within each of the individual corridors; this section provides a summary of all of the BART considerations.

Alternative 1 included the Resolution 3434 projects (Warm Springs and Santa Clara BART, eBART and Oakland Airport Connector) plus all of the major BART system expansion options including the Transbay, I-80, I-680 and I-580 corridors. In contrast, Alternative 2 was limited to the Resolution 3434 projects plus a one-station extension and connectivity enhancement in the I-580 corridor. Alternative 2 anticipates that BART would develop more like a “Metro” system to provide mass transit in the inner Bay Area. As such, Alternative 2 would include the potential for infill stations and other improvements in system capacity, coverage and operational reliability. The corridor-by-corridor analysis indicates that the suburban BART system expansion options included in Alternative 1 do not significantly add to corridor ridership levels compared to the railroad-based options provided in Alternative 2.

One segment, which may require system expansion, is in the Oakland – San Francisco Transbay corridor where the highest ridership is present. In the near term, construction of a fourth track through Oakland would improve line connectivity and capacity including providing for cross-platform transfers between all of the various lines. A new Bay Crossing and San Francisco subway would not only relieve the existing transbay tube and Market Street stations, but would provide an opportunity to improve coverage in San Francisco. The Regional Rail plan tested two alignments resulting in similar cost and ridership levels. Further study of alignments in San

Francisco would be appropriate at such time as a new tube were to be advanced for project development.

Plan Recommendation: Alternative 2 with further development of Metro operating plans and infrastructure; fourth track through Oakland; long-term new Bay Crossing and San Francisco subway line (alignment to be determined)

US 101 North Corridor

The US 101 North corridor has moderate ridership potential, with 9000 to 11,000 daily trips crossing the Marin/Sonoma county line. Alternative 1 includes the SMART service between Larkspur and Cloverdale with capacity and operational improvements to address long-term growth in travel.

Alternative 2 includes a rail connection across the I-580 Bridge to connect the SMART line with the Capitol Corridor in Richmond. The cost of Alternative 2 would be nearly four times the capital cost of Alternative 1. Ridership in the US 101 corridor was found to be similar for both alternatives. Ridership on the East Bay connection was of similar magnitude to that in the US 101 corridor. As a result, Alternative 1 is recommended.

Plan Recommendation: Alternative 1

North Bay Corridor

The North Bay corridor between Marin and Solano Counties has low to moderate ridership potential. Only one rail service alternative was tested in the North Bay – an “X” service plan including an east-west line with a timed transfer to a north-south line at Napa Junction.

Plan Recommendation: Preserve corridor in near term and develop rail services in phased plan over the longer term

Interstate 80 Corridor

The I-80 corridor has high ridership potential, which is served by BART and Capitol Corridor along the Eastshore area with Capitol Corridor extending beyond to Sacramento. Alternative 1 would develop the UPRR/Capitol Corridor line between Oakland and Sacramento with a range of capacity and operational improvements. Given the high existing level of freight traffic and the expectation that goods movement to and from the Port of Oakland will grow significantly, the line would need to be expanded to three or four main tracks where possible over the long term. The BNSF transcontinental freight line connects to the UPRR line in Richmond. BNSF considers this line to be a vital freight connection to the Port of Oakland and does not want to encumber it with passenger traffic. (In fact, existing passenger trains entering the Bay Area from Stockton on the BNSF are shifted to the UPRR line east of Martinez near Port Chicago.) Passenger improvements would be focused on the UPRR line including a new high level passenger bridge at Benicia, and curve straightening between Pinole and Martinez.

Alternative 2 considered provision of separate passenger-only tracks within the UPRR right-of-way to support the operation

of lightweight passenger equipment. This alternative also included a revised alignment north of Hercules to follow I-80 across a new Carquinez bridge at Vallejo and continuing on to reconnect with the UPRR line near Cordelia. Although Alternative 2 resulted in significant travel time savings and higher ridership compared to Alternative 1, the capital cost of Alternative 2 was about twice the cost of Alternative 1. In addition, implementation of separate passenger-only tracks for lightweight equipment is in conflict with UPRR policies as well as the long-range plan for the Capitol Corridor. Given that significant service improvements can be provided using standard equipment shared with freight, the evaluation indicates that Alternative 1 is the most appropriate solution for the UPRR/Capitol Corridor line.

The BART extension to North Hercules included in Alternative 1 would add \$1.5 to \$1.8 billion to the cost of the network making the total investment in the corridor similar to Alternative 2. However, with shared operation of the freight trackage and expansion to 4 tracks between Oakland and Richmond, there would be adequate track capacity to provide overlay services such as a “wBART” local train operating on conventional rail in lieu of extending the BART system. Given the physical and operational constraints of the single-track BNSF line, the overlay services would likely be confined to the UPRR along San Pablo Bay. If such local service was provided, ridership in the corridor is expected to be about the same as with a BART extension.

Plan Recommendation: Alternative 1 with potential for local passenger services on expanded UPRR line

East Bay Corridor

The East Bay corridor between Oakland and San Jose has very high ridership potential and is served by BART and the Capitol Corridor. Alternative 1 would result in expansion of the Niles Subdivision to provide 3 main tracks for operation of passenger services shared with freight.

Alternative 2 considers construction of a new passenger line for lightweight equipment operating between Oakland and San Jose along the UPRR right-of-way north of Fremont and via I-880, Trimble Road and the Caltrain corridor south of Fremont. Provision of a new passenger-only line would require more than twice the investment required to upgrade the existing Capitol Corridor route and would not significantly reduce the travel time or increase ridership. In addition, Alternative 2 would require right-of-way to be obtained from UPRR and is not consistent with the Capitol Corridor long-range plan.

Plan Recommendation: Alternative 1

Transbay Corridor

The Transbay market between Oakland and San Francisco has the highest transit and rail ridership demand compared to any corridor or segment in the Regional Rail system – Under Year 2050 Baseline conditions without either Regional Rail Alternative, the Transbay corridor market potential is over 400,000 daily trips. Alternative 1 addresses this demand by providing a new BART Transbay Tube paired with a new San Francisco subway to provide station capacity distribute patrons to stations and connect with regional and local services. Track connections could be made to the existing

BART Market Street line to improve system reliability by providing alternate means of routing trains between Oakland and San Francisco.

In contrast, Alternative 2 would make a standard rail connection via a rail tunnel between tracks in the East Bay and Caltrain, thereby allowing movements such as interlining trains between the Capitol Corridor and Caltrain. However, with Capitol Corridor operating standard equipment and Caltrain tracks devoted to lightweight equipment, a change in regulatory provisions – either a change in Federal Railroad Administration rules or rules waivers in conjunction with improved signaling to allow mixed flow – would be required if trains were to interline between the East Bay and Peninsula.

Analysis of the Transbay peak period ridership indicates BART will be constrained by Year 2030 and over-capacity by Year 2050. Therefore, a new BART Transbay Tube has been indicated in the long-range scenario. Given the significant environmental review process, regulatory approvals, and high cost of such an investment, it is recommended that, should a new Bay Crossing be provided, four standard rail tracks be included to provide a conventional rail connection as well. The cost of this additional provision would be lower as a combined project than if separate BART and rail tunnels were to be built.

Plan Recommendation: Alternative 1 with Alternative 2 (both options in long term future)

Peninsula Corridor

The Peninsula corridor between San Francisco and San Jose has high ridership, which is served by Caltrain and, north of Millbrae, by BART. Both Alternatives 1 and 2 would include provision of electrification, additional trackage and grade separations included in the Caltrain long-range development plan to allow the service to operate with approximate 7.5 minute headways during peak periods. However, Alternative 2 includes a rail tunnel connection to the East Bay (cost included as part of “Transbay” corridor) and interlining of the Capitol Corridor trains through the Peninsula to San Jose. (In the East Bay, Oakland – San Jose service on the new passenger alignment would also be provided.) In Alternative 1, Caltrain would operate with standard equipment. In Alternative 2, Caltrain would operate with lightweight equipment – electric multiple unit trains as indicated in the Caltrain Project 2025 plan. The primary factor resulting in higher cost in Alternative 2 is associated with providing a connection to the Transbay rail tunnel. In view the similar costs and ridership, Alternative 2 is recommended for consistency with the Caltrain desire to deploy lightweight equipment.

Plan Recommendation: Alternative 2

South Counties Corridor

The South Counties corridor extending south from San Jose to the Monterey Bay cities has moderate ridership potential. Both Alternative 1 and Alternative 2 would develop a network of standard rail services operating both along the UPRR Coast Subdivision as well as along a “wharf-to-wharf” line between Monterey and Santa Cruz with transfer points at Castroville

and Pajaro. Alternative 2 would develop a separate higher-speed passenger-only line south from San Jose to Gilroy with an extension to Hollister, which could be served by lightweight Caltrain equipment interlined to Peninsula destinations. The evaluation indicated that either alternative would have similar ridership potential. However, Alternative 2 would require nearly twice the capital investment to provide separate higher speed passenger tracks and would also require riders to transfer at Gilroy for Peninsula services. As a result of the evaluation, Alternative 1 is recommended. It should be noted that when Caltrain converts the Peninsula line between San Francisco and San Jose to operation of lightweight equipment, standard equipment trains operating in the South Counties and into the Bay Area might not be able to operate north of San Jose. Such trains could, however, proceed north along tracks shared with freight in the East Bay. Therefore, interlining South Counties services with East Bay services may be appropriate in the longer term.

Plan Recommendation: Alternative 1

Dumbarton Corridor

The Dumbarton corridor between Redwood City and Union City has low to moderate ridership potential. Alternative 1 includes restoration of the a single-track bridge as well as additional improvements necessary to provide a connection to the Union City BART station along the Oakland Subdivision. Passenger and freight traffic would be separated south of Industrial Boulevard in Hayward by routing freight traffic via the Niles Subdivision and passenger traffic via the Oakland Subdivision.

Alternative 2 includes construction of a new 2-track, high-level bridge suitable for interlining lightweight equipment between Union City and points along the Peninsula. Alternative 2 also includes operation of lightweight equipment to Modesto and Tracy. This requires substantial track upgrades in the the Tri Valley area and over Altamont. The evaluation indicated that ridership would be significantly higher if trains from Union City could operate on Peninsula trackage. However, providing a new bridge would nearly double the cost of Alternative 2 compared to Alternative 1. The recommended strategy, therefore, is provision of separate passenger tracks from Union City through Fremont. Between Newark and Redwood City, trains would operate over a rehabilitated bridge as included in Alternative 1. A single-track low-level bridge would provide adequate capacity to meet the Dumbarton operating plan requirements.

Plan Recommendation: Blend (Separate passenger tracks with rehabilitated low-level bridge)

Interstate 680 and Tri Valley Corridor

The Interstate 680/Tri Valley corridor has moderate ridership potential with an east-west market paralleling I-580 and a north-south market paralleling I-680. Alternative 1 includes a BART line in the I-680 corridor as well as a BART extension in I-580 to Greenville Road. In contrast, Alternative 2 has a regional bus option in the I-680 corridor, a shorter BART extension to a new ACE intermodal at Isabel/Stanley, and a

significant upgrade of the ACE service to Caltrain-like performance by providing separate passenger-only tracks with a new alignment over Altamont Pass and a tunnel under Niles Canyon. Alternative 2 resulted in significantly higher ridership due to the east-west improvements. However, the ridership gain was not high enough to justify the capital cost of the upgraded ACE service, which was four times the capital cost of the rail improvements included in Alternative 1.

Additionally, the freight rail line would need to remain in service to accommodate freight traffic between the Central Valley and East Bay / South Bay, and improvements could be made to the existing line and/or on the parallel abandoned Southern Pacific line to improve the reliability and frequency of ACE services shared with freight. A one station BART extension to meet ACE would improve connectivity and coverage with less cost than an extension in the median of I-580 all the way to Greenville Road.

Bus in the I-680 corridor would be more cost effective than a new BART line and would leverage several existing and planned express bus/BRT investments. Review of the station boardings indicated that most of the high ridership locations were concentrated in the San Ramon – Pleasanton reach which could be served by buses in the corridor connecting to existing BART lines.

Plan Recommendation: Blend (Alternative 1 for railroad-based services plus Alternative 2 for BART)

Central Valley Corridor

The Central Valley corridor has relatively low ridership potential compared to most of the other Regional Rail corridors. Alternative 1 would provide trackage improvements for shared operation of passenger services north-south along the corridor as well as connecting services through the Tri Valley area to the inner Bay Area. Alternative 2 would provide separate passenger-only trackage suitable for operation of lightweight trains provided such trains could operate into this territory from the inner Bay Area, which would require treatment similar to Alternative 2 to be provided through the Tri Valley. Regardless of the development of regional corridor trains serving the Central Valley, the Amtrak San Joaquins would continue to provide long-haul services on less frequent schedules. As shown in the evaluation, Alternative 2 would be about twice the cost of Alternative 1 but was not found to carry significantly more riders in the north-south direction (although significantly higher ridership to the East Bay would result as shown in the evaluation of the Tri Valley corridor.)

The overall level of corridor ridership between the Central Valley and the Bay Area was not deemed high enough to justify the very high cost of providing separate trackage for lightweight equipment in the Central Valley, even if it could operate through the Tri Valley area. Therefore Alternative 1 is recommended. However, UPRR has indicated that the north-south lines are approaching capacity and does not want to consider accommodating passenger traffic or selling right-of-way at this point in time. Accordingly, assembly of additional right-of-way paralleling the UPRR north-south alignment would be required to implement corridor passenger service along the UPRR alignment.

Plan Recommendation: Develop separate passenger right-of-way paralleling the UPRR right-of-way for operation of standard equipment.

Summary

Table 7.0-2 compares the projected 2050 ridership of the four existing rail services for each study alternative. Overall, Alternative 1 captures 34 percent more ridership, while Alternative 2 attracts 13 percent compared to the Baseline. BART's ridership potential under both Alternatives 1 and 2 far exceeds the Baseline; and under Alternative 2 where BART functions as a metro system with limited extensions, BART continues to capture significant ridership. ACE's ridership is considerably lower in Alternative 1 compared to both the Baseline and Alternative 2, but as will be shown later in this report, there are opportunities to upgrade ACE in concert with high-speed rail, thereby producing higher ridership levels overall for this rail corridor. The recommended "hybrid" regional rail network achieves ridership levels of 1.3-million, which is comparable to Alternative 1 but at a considerably less capital cost.

The capital cost of Alternative 1 with BART and rail is estimated at \$40 billion, with \$1.6 billion in annual operating costs. The capital cost of Alternative 2 is priced at \$37 billion, with \$1.3 billion in annual operating costs. The recommended "hybrid" network, blending elements of both, has an estimated capital cost of \$35 billion and \$1.4 billion in annual operating costs. An additional \$8 billion would be required for BART Core Capacity improvements, bringing the total to \$43 billion. The Resolution 3434 component of this total is \$10 billion. The costs cited herein are in 2006 dollars.

**Table 7.0-1: Alternatives Evaluation Summary Table -
Regional Rail Without High-Speed Rail**

	Capital Cost (\$-million 2006)	Daily Systemwide Travel Demand (2050)	Operational Plans & Impacts	Coverage & Connectivity	Environmental Issues	Implementation Issues
BART System *1 – Alternative 2 recommended						
Alt 1 Existing system with Second Transbay Tube; new SF and I-680 Lines; and North Hercules and Livermore (Greenville Rd.) Extensions	BART \$21,700 – \$26,500 *2	845,000 – 1,030,000	Addresses transbay demand by providing new line to San Francisco New Transbay connection improves reliability Peak period headways, 6 mins; off-peak, 12 mins on 7 lines (Oakland Airport Connector: 3.5 / 7 mins peak / off-peak)	New SF subway line adds coverage to Alameda & NW San Francisco Capitol Corridor / BART at West Oakland (existing lines) & Jack London (new bay crossing) ACE / BART at Greenville/ I-580 in Livermore	New Bay Crossing Tunneling & subway construction impacts Impacts to freeway facilities Impacts to adjacent properties	Extensive planning process required to finalize extension alignments and stations Very large funding requirement Possible service disruption during construction
Alt 2 Existing system with Livermore (Isabel Ave. / Stanley Blvd.) Extension	BART \$6,400 – \$7,900 *3	730,000 – 890,000	Addresses Transbay demand by increasing service in core and modifying car configuration Peak period headways, 6 mins; off-peak, 12 mins on 3 lines; peak / off-peak headways, 12 mins on 3 lines (Oakland Airport Connector: 3.5 / 7 mins peak / off-peak)	Capitol Corridor / BART at West Oakland ACE / BART at Isabel/ Stanley in Livermore Infill stations	Overall fewer impacts due to less system expansion	Refine policies to address infill stations
*1 – Includes Warm Springs & Santa Clara Extensions and eBART (Resolution 3434) *2 – BART Cost Breakout: Includes 4 th Track through Oakland, new Transbay Tube and SF subway line, I-80 extension, I-580 extension to Greenville and new I-680 line *3 – BART Cost Breakout: Includes Infill Stations and I-580 extension to Isabel/Stamley						

	Capital Cost (\$-million 2006)	Daily Travel Demand at County Line (Rail Trips 2050)	Operational Plans & Impacts	Coverage & Connectivity	Environmental Issues	Implementation Issues
US 101 North Corridor – Alternative 1 recommended						
Alt 1 SMART service between Cloverdale and Larkspur	\$430 – \$530	Marin / Sonoma 9,000 – 11,000	Stand-alone service Peak period / direction headways of 20 mins; off- peak headways, 40 mins	Regional Bus and Ferry Connection to North Bay corridor at Ignacio	Nominal; mostly within rail right-of -way	
Alt 2 SMART service between Cloverdale and Larkspur Rail connection across reconstructed Richmond-San Rafael Bridge to connect SMART with Capitol Corridor in Richmond	\$1,600 – \$1,950	Marin / Sonoma 12,000 – 15,000 Marin / Contra Costa 11,000 – 13,000	Service interlined with East Bay Services; more complex operating plan Sonoma – Marin service: peak period, peak direction headways of 30 min.; off- peak headways, 60 min. Sonoma – Stockton service: peak period / direction headways of 60 mins; off- peak headways, 120 mins	Rail, Regional Bus and Ferry Connection to North Bay corridor at Ignacio Connection to Capitol Corridor at Richmond	New Bay Crossing	Schedule integration with East Bay services

	Capital Cost (\$-million 2006)	Daily Travel Demand at County Line (Rail Trips 2050)	Operational Plans & Impacts	Coverage & Connectivity	Environmental Issues	Implementation Issues
North Bay Corridor – Alternative 1 recommended						
Alt 1 Rail from St. Helena to Vallejo (feeder bus to Calistoga) and San Rafael to Fairfield/Vacaville	\$670 - \$810	Napa / Solano 3,000 – 4,000	North-south plus east-west corridor requires complex operating plan to serve all market patterns Peak / off-peak headways of 60 mins (Alt. 1); peak / off-peak headways of 30 mins (Alt. 2)	Rail and Ferry Ties US 101 North rail corridor to I-80 rail corridor; only existing rail connection	Wetlands along east-west alignment	Schedule coordination of N/S with E/W service & E/W service with SMART, ferries and Capitol Corridor
Alt 2 Rail from St. Helena to Vallejo (feeder bus to Calistoga) and San Rafael to Fairfield/Vacaville		Napa / Solano 3,000 – 4,000				

	Capital Cost (\$-million 2006)	Daily Travel Demand at County Line (Rail Trips 2050)	Operational Plans & Impacts	Coverage & Connectivity	Environmental Issues	Implementation Issues
I-80 Corridor *4 – Alternative 1 recommended for Rail; Alternative 2 recommended for BART (add Hercules – Union City rail overlay)						
Alt 1 Upgrade UPRR line to 3 or 4 tracks with grade separation and operational impvts; add grade separations to 4-track segments Extend BART Richmond line to intercept station on I-80 north of Hercules	Rail & BART \$3,450 – \$4,180	Yolo / Solano 39,000 – 48,000 Contra Costa / Solano 43,000 – 53,000 Contra Costa / Alameda Rail & BART 84,000 – 103,000	Critical freight corridor most suitable for operation of standard passenger equipment Oakland – Sacramento travel time 92 mins Peak / off-peak headways of 30 mins (Sacramento – San Jose); peak / off-peak headways of 60 mins (Auburn – San Jose)	Bus, Amtrak & BART in East Bay; Bus, Amtrak & Sacramento Regional Transit LRT at Sacramento Maintains connectivity with San Joaquin long haul services at Martinez I-80 BART extension	Bay edge track improvements Pinole – Martinez, new bridge at Benicia, improvements through Suisun marsh and Yolo Causeway may result in impacts to SF Bay, US waters, wetlands and sensitive habitat Grade separation r/w and circulation impacts Environmental justice concerns: improvements to corridor passing through disadvantaged neighborhoods	Environmental clearance UPRR has accepted track improvements to provide passenger slots Grade separations and road closures developed incrementally in conjunction with four-track sections
Alt 2 New passenger line for lightweight equipment from Oakland to Auburn via UPRR; follows I-80 between Hercules and Cordelia, including new bridge across Carquinez Strait at Vallejo	Rail \$3,730 – \$4,560	Yolo / Solano 34,000 – 42,000 Contra Costa / Solano 56,000 – 68,000 Contra Costa / Alameda Rail & BART 133,000 – 163,000	Oakland – Sacramento travel time 63 mins Peak headways of 30 mins, off-peak headways of 60 mins (Auburn – San Jose); peak headways of 15 mins, off-peak 30 mins (Sacramento – San Jose express)	Bus, Amtrak & BART in East Bay, Bus, Amtrak & Sacramento Regional Transit LRT at Sacramento Provides direct rail service to Vallejo; does not serve Martinez Amtrak Connects with new Oakland – San Francisco rail tunnel	Slightly less overall impact compared to Alt 1 but new water crossing (Carquinez) and improvements at Yolo Causeway may result in impacts to SF Bay, US waters, wetlands and sensitive habitat Grade separation r/w and circulation impacts Environmental justice concerns: improvements to corridor passing through disadvantaged neighborhoods	Environmental clearance Higher speed passenger tracks and four-track sections will require grade separations and closure of minor roads Construction of high speed passenger tracks in rail r/w conflicts with UPRR
*4 – Includes Capitol Corridor service improvements (Resolution 3434)						

	Capital Cost (\$-million 2006)	Daily Travel Demand at County Line (Rail Trips 2050)	Operational Plans & Impacts	Coverage & Connectivity	Environmental Issues	Implementation Issues
East Bay Corridor *5 – Alternative 1 recommended (with Hercules – Union City rail overlay)						
Alt 1 Expand Niles Subdivision to provide 3 tracks for operation of passenger services with freight	\$1,110 – \$1,350	Alameda / Santa Clara Rail & BART 91,000 – 111,000	Freight corridor provides connection to Coast Subdivision; used to return empty containers to Port of Oakland Potential for short haul freight Oakland – San Jose travel time 53 mins Peak / off-peak headways of 30 mins (Sacramento – San Jose); peak / off-peak headways of 60 mins (Auburn – San Jose)	Bus, Amtrak & BART in East Bay; Caltrain and Valley Transportation Authority LRT in San Jose; Oakland Airport BART I-680 line and 2-station extension in I-580 provides significant increase in coverage and connectivity to South Bay	Mostly within rail right-of-way Trestle along Bay edge Newark – Alviso Environmental justice concerns: improvements to corridor passing through disadvantaged neighborhoods	UPRR has accepted track improvements to provide slots for passenger service
Alt 2 Separate passenger-only tracks from Oakland to San Jose via UPRR north of Fremont and via I-880, Trimble Road and Caltrain corridor south of Fremont	\$2,540 – \$3,100	Alameda / Santa Clara Rail & BART 84,000 – 103,000	Freight would remain on existing lines with new passenger alignment Oakland – San Jose travel time 41 mins Peak / off-peak headways of 30 mins (Oakland – San Jose express)	Bus, Amtrak & BART in East Bay; Caltrain and Valley Transportation Authority LRT in San Jose; Oakland Airport & San Jose Airport Great America station not served; replaced with I-880 / Montague	Mostly within rail right-of-way Development of passenger tracks requires full grade separation using aerial structure or modification of local roadways and circulation Environmental justice concerns: improvements to corridor passing through disadvantaged neighborhoods	Not consistent with Capitol Corridor long range plan Construction of high speed passenger tracks in rail r/w conflicts with UPRR
*5 – Includes Capitol Corridor service improvements (Resolution 3434)						

	Capital Cost (\$-million 2006)	Daily Travel Demand at County Line (Rail Trips 2050)	Operational Plans & Impacts	Coverage & Connectivity	Environmental Issues	Implementation Issues
Transbay Corridor – both Alternative 1 and Alternative 2 recommended in long-term future						
Alt 1 New BART transbay crossing connecting to new SF subway line	BART *6 \$10,200 – \$12,500	Alameda / San Francisco BART 396,000 – 494,000 New SF Subway *7 BART 35,000 – 43,000	Addresses Transbay demand with BART Construction of new BART tube and SF subway line improves BART system reliability Peak headways of 3 mins, off-peak headways of 6 mins through each BART Transbay Tube	Bus, Amtrak & BART in Oakland; Bus, BART, Caltrain & MUNI LRT in San Francisco Construction of new BART SF subway line improves coverage to San Francisco	New Bay Crossing (BART)	Approvals for new Bay Crossing
Alt 2 New rail tunnel with trackage in East Bay and San Francisco, interlining trains between Capitol Corridor and Caltrain	Rail *8 \$1,910 – \$2,330	Alameda / San Francisco BART 370,000 – 450,000 Rail 63,000 – 79,000 Total 433,000 – 529,000	Provides option to route East Bay & I-80 Corridor trains to San Francisco Peak headways of 2 mins, off-peak headways of 6 mins through each Transbay Tube Peak headways of 30 mins, off-peak headways of 60 mins (Auburn – San Jose); peak headways of 15 mins, off-peak 30 mins (Sacramento – San Jose express)	Improves connectivity of Peninsula and East Bay rail networks	New Bay Crossing (Rail Tunnel)	Approvals for new Bay Crossing East Bay equipment not compatible with Peninsula equipment over long term Trade-offs between sunken tube & bored tunnel
*6 – BART cost includes new SF subway line; cost of transbay crossing and SF subway to Market Street is \$7,200 – \$8,800 *7 – Trips within San Francisco (over and above Transbay trips through new tube) *8 – Rail cost includes transbay rail tunnel only						

	Capital Cost (\$-million 2006)	Daily Travel Demand at County Line (Rail Trips 2050)	Operational Plans & Impacts	Coverage & Connectivity	Environmental Issues	Implementation Issues
Peninsula Corridor *9 – Alternative 2 recommended						
Alt 1 Improve capacity to 2-4 tracks, grade separation to support express and local services with electrified standard equipment	\$4,250 – \$4,950	San Mateo / Santa Clara 41,000 – 51,000	Maintains ability to operate passenger shared with freight San Jose – San Francisco travel time 57 mins Peak headways of 15 mins, off-peak headways of 30 mins (Salinas – San Francisco); peak headways of 15 mins, off-peak 30 mins (San Jose – San Francisco express)	Bus, BART & MUNI LRT in San Francisco; Bus, BART, Amtrak, Santa Clara Valley Transit Authority LRT, ACE, Capitol Corridor in San Jose; SFO Airport & San Jose Airport	Mostly within rail right-of-way Grade separation r/w and circulation impacts	Use of standard equipment not consistent with Caltrain long range plan for corridor Narrow r/w sections require tunneling or aerial track segments for express track
Alt 2 Same as Alt 1 with rail tunnel connection to the East Bay and interlining of Capitol Corridor through Peninsula to San Jose	\$4,400 – \$5,100	San Mateo / Santa Clara 49,000 – 60,000	Freight accommodated at night (temporal separation) San Jose – San Francisco travel time 45 mins Peak headways of 30 mins, off-peak headways of 60 mins (San Francisco - Hollister); peak headways of 30 mins, off-peak 60 mins (San Jose – Auburn); peak headways of 15 mins, off-peak 30 mins (San Jose – San Francisco express)	Bus & MUNI LRT in San Francisco; Bus, BART, Amtrak, Santa Clara Valley Transit Authority LRT, ACE, Capitol Corridor in San Jose; SFO Airport & San Jose Airport Connects to rail tunnel to East Bay at San Francisco	Mostly within rail right-of-way Grade separation r/w and circulation impacts	Use of lightweight equipment consistent with Caltrain long range plan for corridor Narrow r/w sections require tunneling or aerial track segments for express track
*9 - Includes Caltrain line improvements, downtown SF extension and Transbay Transit Center (Resolution 3434)						

	Capital Cost (\$-million 2006)	Daily Travel Demand at County Line (Rail Trips 2050)	Operational Plans & Impacts	Coverage & Connectivity	Environmental Issues	Implementation Issues
South Counties Corridor – Alternative 1 recommended						
<p>Alt 1</p> <p>Standard rail services operating both along UPRR Coast Subdivision and “wharf-to-wharf” line between Monterey and Santa Cruz with transfer points at Castroville and Pajaro</p>	\$1,440 – \$1,760	Santa Clara / San Benito 6,000 – 8,000	<p>Standard equipment may not operate north of San Jose on Peninsula in the event Caltrain is converted to lightweight equipment</p> <p>Peak headways of 60 min., off-peak headways of 120 min. (Santa Cruz – Monterey); peak / off-peak headways of 60 min. (Gilroy - Hollister)</p>	<p>Bus, Amtrak, BART, ACE, Caltrain& Capitol Corridor at San Jose</p> <p>Monterey Bay cities at Pajaro & Castroville</p>	Mostly within rail right-of-way	<p>Use of standard equipment compatible with existing freight corridor</p> <p>UPRR has accepted track improvements to provide slots for passenger service (San Jose to Gilroy)</p>
<p>Alt 2</p> <p>Same as Alt 1 with separate higher-speed passenger-only line south from San Jose to Gilroy with extension to Hollister</p>	\$2,280 – \$2,790	Santa Clara / San Benito 10,000 – 12,000	<p>Lightweight equipment can interline on Peninsula</p> <p>Standard equipment could not operate on trackage with lightweight equipment; would remain on freight track(s)</p> <p>Peak headways of 30 mins, off-peak headways of 60 mins (Santa Cruz – Monterey); peak / off-peak headways of 60 mins (Gilroy - Salinas)</p>	<p>Bus, Amtrak, BART, ACE, Caltrain& Capitol Corridor at San Jose</p> <p>Monterey Bay cities at Pajaro & Castroville</p> <p>Forced transfer at Gilroy to lightweight equipment for trips between Bay Area and South Counties</p>	Mostly within rail right-of-way	<p>Requires high cost re-build of Monterey Highway to fit separate passenger tracks in narrow right-of-way</p> <p>Construction of high speed passenger tracks in rail r/w conflicts with UPRR</p>

	Capital Cost (\$-million 2006)	Daily Travel Demand at County Line (Rail Trips 2050)	Operational Plans & Impacts	Coverage & Connectivity	Environmental Issues	Implementation Issues
Dumbarton Corridor *10 – Alternative 1 recommended with separate passenger-only track to Union City						
Alt 1 Single-track Dumbarton bridge with connection to Union City BART	\$680 – \$830	Alameda / San Mateo 6,000 – 8,000	Use of standard equipment may require forced transfer at Redwood City due to capacity constraints on Caltrain and use of lightweight equipment on Peninsula Peak period / direction headways of 30 mins, off- peak headways of 60 mins	Alts 1 & 2 similar – BART, Capitol Corridor & ACE in East Bay and Caltrain on Peninsula	Repair, replace missing bridge sections and return to service with single track bridge resulting in possible impacts to SF Bay waters, wetlands, wildlife preserve, sensitive habitat	
Alt 2 New 2-track high- level bridge for operation of lightweight passenger equipment	\$1,130 – \$1,380	Alameda / San Mateo 19,000 – 23,000	Lightweight equipment can interline on Peninsula Standard equipment from East Bay could not operate on trackage with lightweight equipment Peak period / direction headways of 60 mins, off- peak headways of 120 mins (Merced – San Francisco); peak period / direction headways of 60 mins, off- peak headways of 120 mins (Union City – San Jose); peak / off-peak direction headways of 60 mins, off- peak headways of 60 mins (West Oakland – San Jose)		Replacement Bay Crossing with 2-track high level bridge resulting in possible impacts to SF Bay waters, wetlands, wildlife preserve, sensitive habitat Higher potential for disruption compared to Alt 1	Approvals for new Bay Crossing
*10 – Resolution 3434						

	Capital Cost (\$-million 2006)	Daily Travel Demand at County Line (Rail Trips 2050)	Operational Plans & Impacts	Coverage & Connectivity	Environmental Issues	Implementation Issues
I-680 & Tri Valley Corridor – Alternative 1 recommended for Rail; Alternative 2 recommended for BART						
<p>Alt 1</p> <p>New BART line along I-680 from Warm Springs BART to intermodal with Capitol Corridor at Martinez, transfer stations at West Dublin and Walnut Creek</p> <p>New BART line along I-580 to Greenville</p>	<p>Rail \$820 – \$1,010</p> <p>BART \$4,640 – \$5,670</p>	<p>Alameda / San Joaquin Rail 8,000 – 9,000</p> <p>BART 48,000 – 58,000</p>	<p>Standard equipment compatible with Capitol Corridor and existing Coast Subdivision Newark – San Jose</p> <p>Maintains ability to operate freight trains between East Bay and Central Valley using shared track</p> <p>Peak period peak direction headways of 30 mins, off-peak headways of 60 mins (Sacramento – San Jose)</p>	<p>Bus, BART & ACE at Greenville/ I-80</p> <p>New BART line provides coverage to I-680 corridor and connects Martinez Amtrak, existing BART lines and Silicon Valley BART</p>	<p>Mostly within rail right-of-way</p>	<p>Rail options in Altamont corridor would include expansion of UPRR subdivision and/or returning sections of abandoned SPRR to service</p> <p>Cost for I-680 BART assumes aerial structure as “minimum” cost to provide line; but cost could be twice as high if subway</p>
<p>Alt 2</p> <p>Regional express bus along I-680</p> <p>New BART line along I-580 to new ACE intermodal at Isabel / Stanley; significant upgrade of ACE</p>	<p>Rail \$3,510 – \$4,290</p> <p>BART \$500 – \$650</p>	<p>Alameda / San Joaquin Rail 18,000 – 22,000</p> <p>BART 24,000 – 29,000</p>	<p>Central Valley lines need to be fully separated from freight</p> <p>Freight track(s) would need to remain in service to provide connection between East Bay and Central Valley</p> <p>Potential to interline with Peninsula with Alt 2 network to west</p> <p>Peak period peak direction headways of 30 mins, off-peak headways of 60 mins (Sacramento – Hollister)</p>	<p>Bus, BART & ACE at Isabel / Stanley</p> <p>I-680 Regional Bus line provides coverage to I-680 corridor and connects Fairfield/Suisun Amtrak; Martinez Amtrak; BART, ACE and Santa Clara Valley LRT</p>	<p>Constrained r/w Livermore – Pleasanton makes fitting trackage and grade separations difficult as existing freight track(s) would need to remain in service</p>	<p>Rail options in Altamont corridor include costly new rail tunnel under Niles Canyon and new alignment over Altamont Pass</p> <p>Bus alternative in I-680 corridor consistent with Contra Costa County long range plans</p>

	Capital Cost (\$-million 2006)	Daily Travel Demand at County Line (Rail Trips 2050)	Operational Plans & Impacts	Coverage & Connectivity	Environmental Issues	Implementation Issues
Central Valley Corridor – Alternative 1 recommended						
<p>Alt 1</p> <p>Improve BNSF and UPRR lines for shared operations of north-south passenger service</p> <p>Extend eBART to Tracy and Patterson using standard equipment</p>	<p>\$3,320 – \$4,050</p>	<p>Sacramento / San Joaquin 5,000 – 6,000</p> <p>San Joaquin / Stanislaus 6,000 / 8,000</p> <p>Stanislaus / Merced 3,000</p>	<p>UPRR line approaching capacity; would require significant expansion in track capacity to accommodate passenger services</p> <p>Peak / off-peak headways of 90 mins (Oakland – Merced via Stockton); peak / off-peak headways of 60 mins (Oakland – Merced via Union City); peak / off-peak headways of 60 mins (Sacramento – Merced)</p>	<p>eBART extension to Tracy; Tracy to Patterson service</p> <p>ACE expanded to Sacramento – Merced</p> <p>Bus, Amtrak, Capital Corridor, LRT at Sacramento; ACE/eBART at Tracy; Amtrak/ACE at Stockton</p>	<p>New structures at riparian crossings</p>	<p>UPRR wants to preserve existing corridor for freight only</p>
<p>Alt 2</p> <p>Develop separate trackage for operation of lightweight passenger equipment along UPRR</p> <p>Extend eBART to Tracy and Patterson using lightweight passenger equipment</p>	<p>\$5,490 – \$6,710</p>	<p>Sacramento / San Joaquin 11,000 – 14,000</p> <p>San Joaquin / Stanislaus 10,000 / 12,000</p> <p>Stanislaus / Merced 4,000</p>	<p>Would require development of lightweight line over Altamont and down to San Jose to support existing ACE</p> <p>Lightweight network allows interlining on all branches</p> <p>Peak / off-peak headways of 90 mins (Oakland – Merced via Stockton); peak / off-peak headways of 60 mins (Oakland – Merced via Union City); peak / off-peak headways of 60 mins (Sacramento – Merced)</p>	<p>eBART extension to Tracy; Tracy to Patterson service</p> <p>ACE expanded to Sacramento – Merced</p> <p>Bus, Amtrak, Capital Corridor, LRT at Sacramento; ACE/eBART at Tracy; Amtrak/ACE at Stockton</p>	<p>Grade separation r/w and circulation impacts</p> <p>New structures at riparian crossings</p>	<p>UPRR wants to preserve existing corridor for freight only</p>

Table 7.0-2
2050 Average Weekday Daily Total Boardings

Alternative	Service Provider				
	BART	Caltrain	Capitols	ACE	TOTAL
2050 Baseline	830,000	89,000	23,000	24,000	970,000
2050 Alternative 1	1,100,000	120,000	70,000	14,000	1,300,000
2050 Alternative 2	830,000	210,000		49,000	1,100,000
2050 Hybrid	1,000,000	140,000	93,000	21,000	1,300,000

8.0 STUDY OUTCOMES

The Regional Rail study explores three study outcomes:

1. Regional Rail without High-Speed Rail
2. Regional Rail with High-Speed Rail entering from East (Altamont Pass)
3. Regional Rail with High-Speed Rail entering from South (Pacheco Pass)

8.1 Regional Rail Operating Plan Without High-Speed Rail

This section identifies the recommended services and improvements for the Bay Area Regional Rail Plan that emerged from the evaluation of Alternatives 1 and 2, assuming no high-speed rail. Absent high-speed rail, the recommended regional rail network would have the following key characteristics:

- **BART** – Reinvest in existing system to improve reliability and make the following improvements:
 - Improve Core Capacity by making modifications to vehicles, stations, track and signals as they are replaced or upgraded to accommodate passenger growth over the long term
 - Implement Resolution 3434 extensions to Warm Springs/Santa Clara County and eastern Contra Costa County.

- Implement improvements to connect BART with standard railroad services and regional bus lines in various corridors including a one-station extension to an intermodal with ACE at Isabel/Stanley
- Construct 4th track through Oakland to facilitate throughput and improve transfer convenience between East Bay and Transbay lines
- Develop Infill stations at various locations keyed to local land use opportunities in accordance with BART station planning policies
- Further define “Metro” service plan to increase capacity, coverage and reliability to inner Bay Area including the Oakland - Transbay – San Francisco zone; service plan may provide for new skip stop or expanded mid-line turnback capability.
- In the longer term, pursue construction of a second Bay Crossing with new subway line to improve coverage to San Francisco in the long term (paired with rail tunnel)

The Transbay Tube under San Francisco Bay is the backbone of the system, with a throughput of 24-27 trains in each direction during the peak hour. Baseline improvements would improve service reliability and increase capacity of transbay car fleet with operation on 120-second headways. The Regional Rail Plan includes the provision of a second tube and San Francisco subway to relieve the existing tube.

Regionally, BART currently operates five lines as follows:

- **Pittsburg/Bay Point ↔ Daly City:** Service is provided on weekdays every 15 minutes early mornings, during peak periods, midday and evenings. Service is provided every 20 minutes late evenings and all day Saturdays and Sundays.
- **Richmond ↔ Daly City:** Service is provided on weekdays every 15 minutes during peak periods and midday and on Saturdays every 20 minutes during peak periods and midday. No Sunday service.
- **Dublin/Pleasanton ↔ Millbrae:** Service is provided on weekdays every 15 minutes early mornings, during peak periods, midday and evenings. Service is provided every 20 minutes late evenings and all day Saturdays and Sundays.
- **Fremont ↔ Daly City:** Service is provided on weekdays every 15 minutes during peak periods and midday and on Saturdays every 20 minutes during peak periods and midday. No Sunday service.
- **Fremont ↔ Richmond:** Service is provided on weekdays every 15 minutes early mornings, during peak periods, midday and evenings. Service is provided every 20 minutes late evenings and all day Saturdays and Sundays.

The Baseline anticipates reductions in headways to provide 12-minute service on all regional lines. In the longer term, in conjunction with the Regional Rail Plan, BART is considering development of a “Metro” service plan which would further

reduce headways in the inner core to as low as 3-5 minutes depending upon the number of routes present.

- **US 101 North** – Implement SMART project; service plan in the early years will have trains operating on 30-minute headways during peak periods with an approximate 90-minute schedule between Larkspur and Cloverdale. Make capacity and operational improvements over the long term to support 20-minute peak headways and higher ridership levels.
- **North Bay** – Preserve corridor in near and intermediate terms and consider as appropriate to develop north-south and east-west services using standard equipment in the long term with service frequencies on each route of approximately 60 minutes throughout the day with timed transfers at key locations.
- **I-80 & East Bay** – Expand the East Bay rail network from San Jose to Sacramento to 3 tracks with 4 track sections from Oakland to Richmond and in Solano County to support operation of standard higher speed railroad rolling stock compatible with freight traffic.

Current Capitol Corridor schedules provide 32 daily trains with approximately 40-minute headways during peak periods and shoulders of peak periods with approximately 118-minute running time in the Sacramento – Oakland segment and variable headways (14 trains daily) with approximate 65-minute running time Oakland to San Jose. Baseline improvements will reduce headways on the Sacramento – Oakland segment to approximately 40 minutes with 90-minute headways Oakland – San Jose. Regional rail plan improvements will further reduce aggregate headways Sacramento – Oakland to as low as 15

minutes and will reduce travel time between Sacramento and San Jose to 149 minutes. Some of the service in the inner East Bay may be provided by shorter distance trains operating between Union City and Hercules.

- **Transbay** – Provide near term investments in BART Core Capacity including provision of higher-capacity cars, track and signaling and operational improvements; in the longer term, provide new transbay tube and San Francisco BART line paired with rail tunnel in long-term future.

Currently, the maximum number of trains operating in the peak hour is 27 or 28. Baseline improvements will support reliable headways of 2 minutes in existing tube. The Regional Rail Plan includes a second tube and San Francisco line to distribute passengers and relieve overcrowding on the existing tube.

- **Peninsula** – Expand Caltrain to 3 or 4 tracks where feasible and operate with lightweight electric multiple-unit equipment to for rapid acceleration and frequent express and local service on the Peninsula.

Current service plan includes a mix of locals, limited stop trains and “Baby Bullet” express trains with aggregate headways of approximately 15 minutes during peak periods and 30 minutes off peak. Locals operate on approximate 95-minute schedules and express trains on approximate 60-minute schedule. Baseline improvements to the service plan will add trains to reduce aggregate headways to 10 minutes peak period and 20 minutes off peak. The Regional Rail plan anticipates the operation of additional trains to resulting in 7-1/2 minute headways during peak periods and 15 minutes off peak.

- **South Counties** – Caltrain currently operates 6 daily trains to Gilroy. Baseline improvements will enable an operating plan with 2-hour headways in the peak period, peak direction of travel. The Regional Rail Plan includes extension of service to Salinas with further expansion of rail services in South Bay cities using standard equipment to provide rail connections to Monterey and Santa Cruz. Approximate hourly service would be provided on all lines with timed transfers at key locations.
- **Dumbarton** – The Baseline service includes approximately two trains per hour operating between Union City and the Peninsula with standard railroad rolling stock. The Regional Rail Plan includes provision of separate passenger-only trackage to Union City in the longer term to support operation of lightweight equipment compatible with Peninsula train operations allowing Dumbarton trains to interline with Peninsula services. Peak period trains would operate at 30-minute headways between Union City and the Peninsula with hourly service throughout the day.
- **Tri Valley / I-680** – The existing ACE schedule includes 8 daily trains between Stockton and San Jose operating westbound in the am and eastbound in the pm. Trains operate on approximate 135 minute schedule. The Baseline improvements assumes the addition of trains resulting in 30 minute headways in peak travel direction only. The Regional Rail Plan would expand the Altamont and Tri Valley corridor lines to improve service reliability by adding trackage to the existing UPRR line and/or putting segments of the abandoned SPRR back in service to support expanded and improved passenger service along the ACE rail corridor and to accommodate regional freight trains; develop regional bus options in the I-680

corridor. Hourly service would be provided in both directions with 30 minute service for peak period peak direction trains with an approximate 100-minute running time between Stockton and San Jose.

- **Central Valley** – Currently Caltrans Division of Rail and Amtrak provide eight long haul trains daily between Oakland and Bakersfield with four long haul trains daily between Sacramento and Bakersfield. The Division of Rail is currently revising its long range plan. The Regional Rail plan includes expansion of regional service in the Central Valley to provide a regional corridor service between Sacramento and Merced over the long term, interlined with ACE services and complementing the San Joaquin long haul trains. Regional trains would operate on hourly schedules between Merced and Sacramento. Additional trains would operate from Modesto to Oakland or San Jose also on an hourly schedule resulting in 30-minute service over Altamont Pass between the San Joaquin Valley and the Bay Area.

Figure 11

2050 Regional Rail Without High-Speed Rail

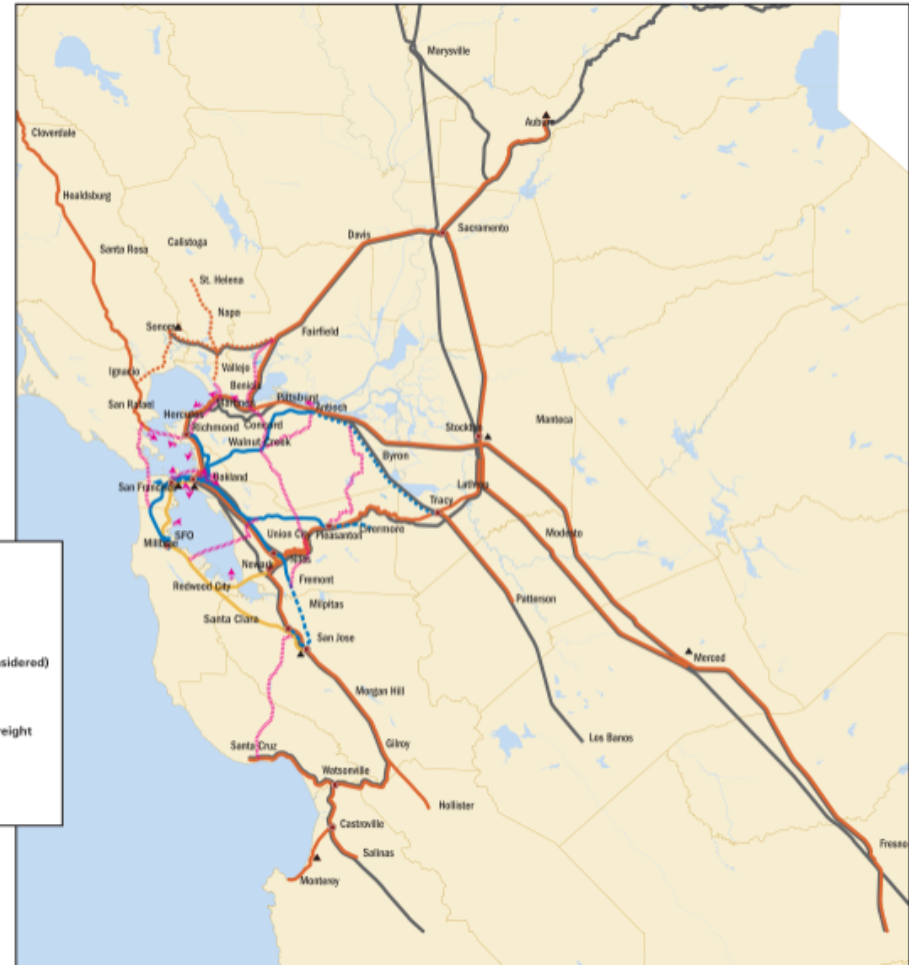
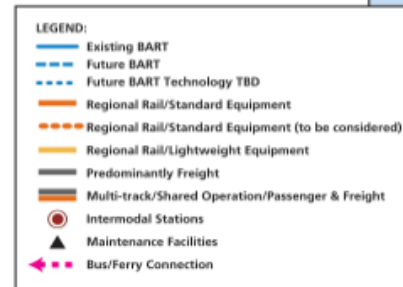


Figure 12

2050 Regional Rail Without High-Speed Rail
(BART System)

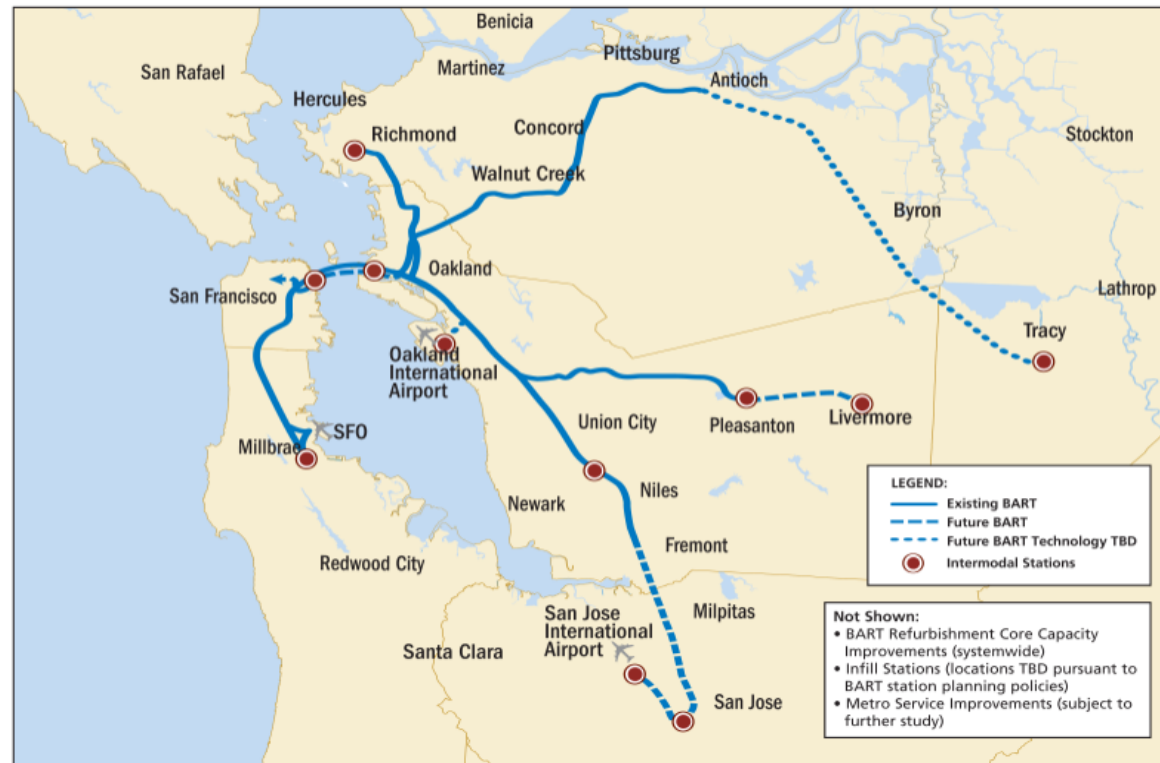


Figure 13

2050 Regional Rail Without High-Speed Rail (North)

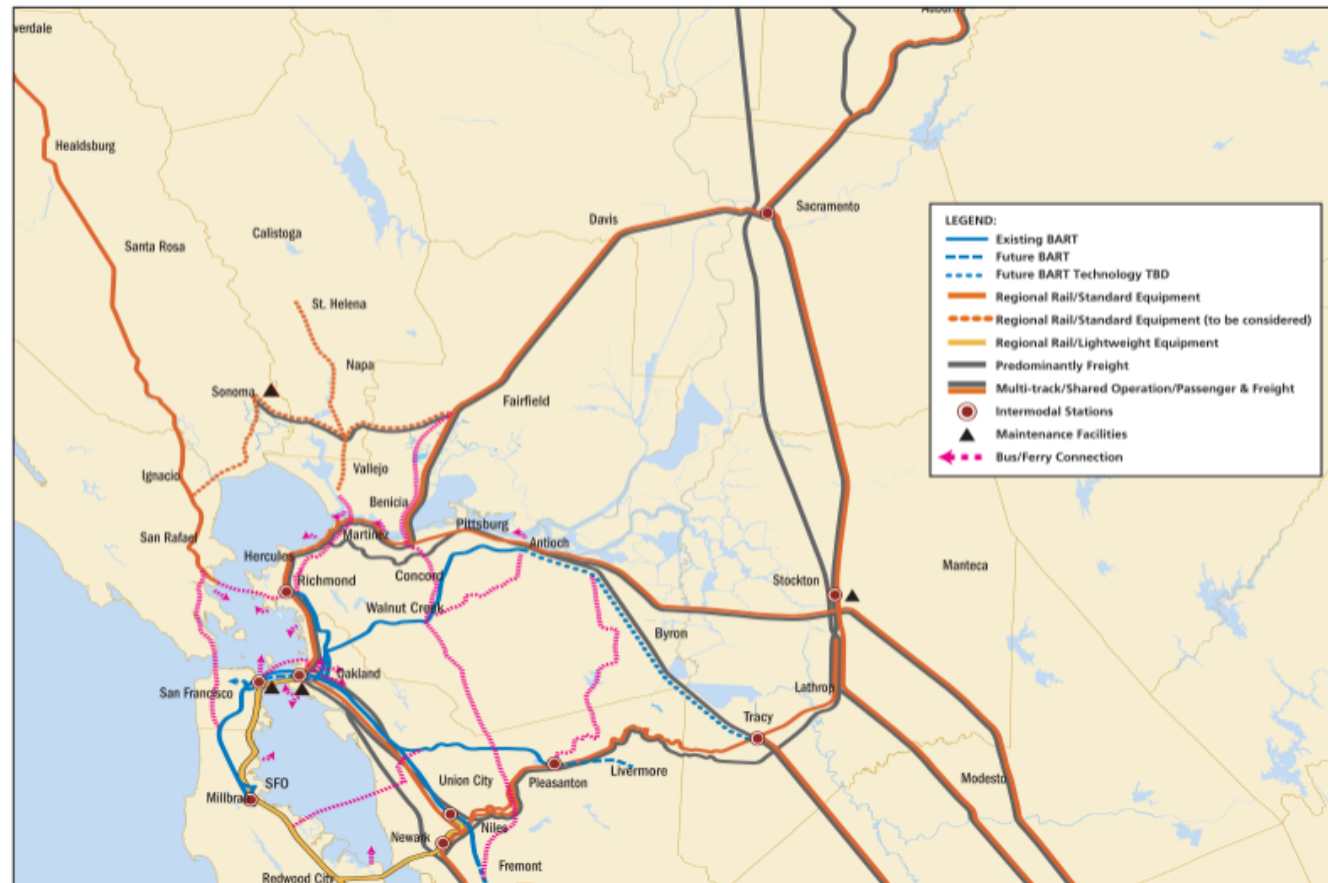


Figure 14

2050 Regional Rail Without High-Speed Rail
(Central)

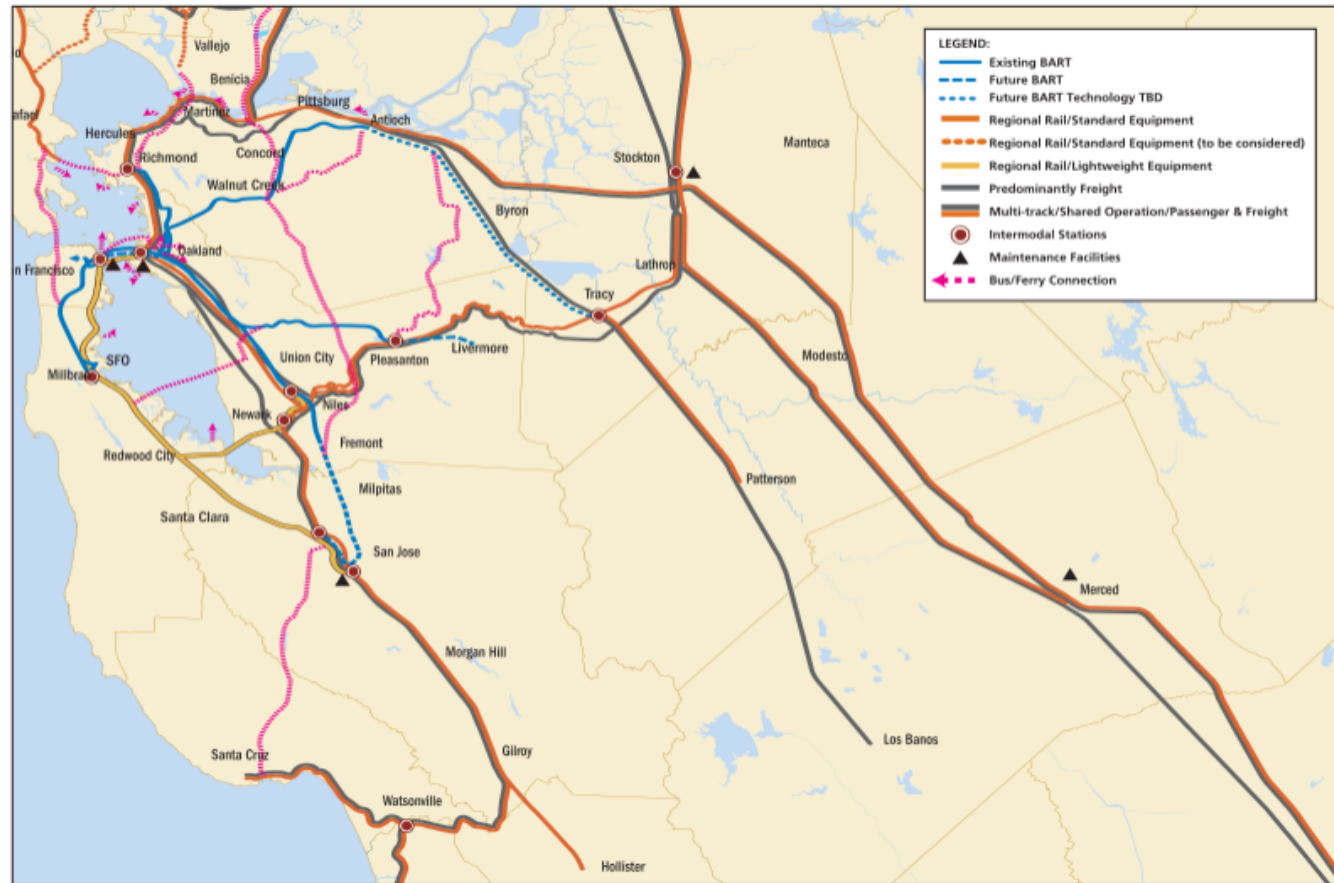
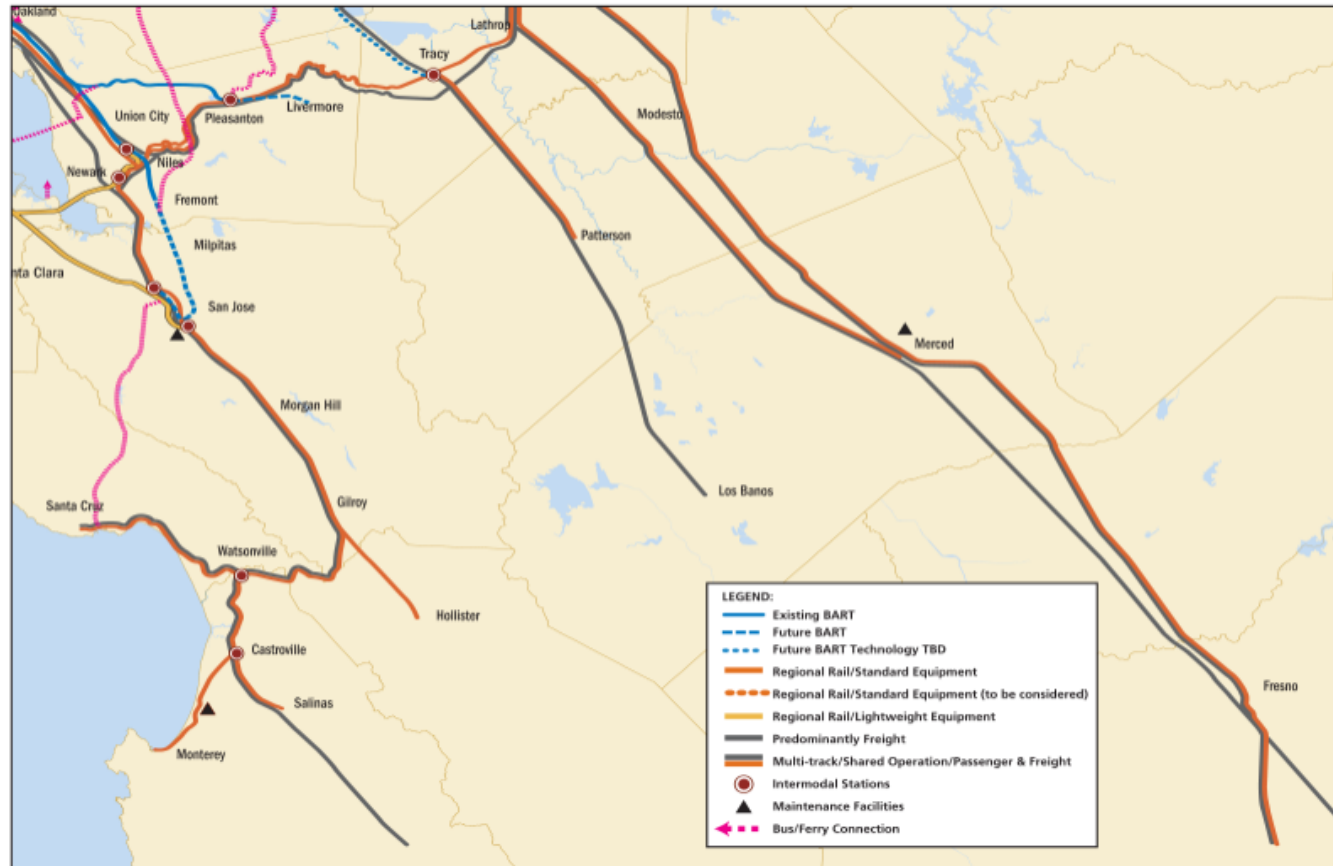


Figure 15

2050 Regional Rail Without High-Speed Rail (South)



8.2 Phased Implementation of Regional Rail without High-Speed Rail

The Regional Rail Plan is financially unconstrained, and funding availability is an important consideration when determining phasing. For purposes of this plan, considerations for phasing include the size of the potential market for various services in each corridor, the development of the systemwide network over time, and the potential to defer high-cost options until later phases. The phasing plan included herein will help to inform the investment decisions to be made in both the financially constrained and vision elements of MTC's Regional Transportation Plan (RTP).

Resolution 3434 defines various improvements in the Regional Rail corridors, which are potentially fundable by Year 2030. The Regional Rail Plan includes provisions, which would result in greater investment in regional services over a timeframe extending to Year 2050. In addition, the Regional Rail Plan also identifies near term provisions, which would be desirable in conjunction with development of projects defined in Resolution 3434.

In general, services and improvements which are high priority and potentially fundable in the near term given existing Resolution 3434 commitments were indicated in the near term. Projects that are very high in cost and which could potentially be deferred or which appear to have promise but are not needed in the near or intermediate term were included in the ultimate plan under the Year 2030 – 2050 category.

A *possible* phasing plan including brief description of the corridor services is presented in Table 8.2-1. The phasing plan is for Regional Rail without High Speed Rail. This plan is provided to show how the system could be improved in phases; development of projects and services would be tied to future project development activities to confirm travel market demands, project descriptions and costs as well as project and service implementation priorities.

Table 8.2-1: Corridor Synopsis & Phasing Plan

Corridor	Synopsis	Present – Year 2015	Year 2015 – Year 2030	Year 2030 – Year 2050
BART System	<ul style="list-style-type: none"> Core Capacity investments to accommodate passenger growth and system expansion Resolution 3434 projects: <ul style="list-style-type: none"> Warm Springs Extension Silicon Valley Extension eBART Oakland Airport Connector Infill stations Operating plan refinements potentially including skip-stop and turn-back service Livermore extension to connect with ACE Completion of Oakland 4th track New transbay tube and SF subway line 	<ul style="list-style-type: none"> Warm Springs extension Oakland airport connector eBART service between Pittsburg and Byron (vehicle technology to be determined) 	<ul style="list-style-type: none"> Silicon Valley extension including San Jose airport connector Peplemover connection to new West Oakland Capitol Corridor station Fourth BART track and Oakland subway lower level platforms Mac Arthur – Oakland Wye Livermore BART extension and ACE intermodal Dublin/Pleasanton – Isabel/Stanley (actual phasing to be determined by more detailed ridership and engineering analysis) Infill Stations (developed in accordance with BART policies) 	<ul style="list-style-type: none"> New Transbay Tube and subway line Oakland – Alameda – San Francisco (specific alignment to be studied further)

Corridor	Synopsis	Present – Year 2015	Year 2015 – Year 2030	Year 2030 – Year 2050
US 101 North (Marin – Sonoma)	<ul style="list-style-type: none"> • Sonoma-Marín Rail Transit Project (SMART) is implemented (Resolution 3434) • SMART service operates with compliant equipment allowing some freight traffic during off-peak periods 	<ul style="list-style-type: none"> • Track, signal and station Improvements to support Larkspur – Cloverdale service (SMART startup) 	<ul style="list-style-type: none"> • Operational improvements to support expanded operations 	<ul style="list-style-type: none"> • Operational improvements to support expanded operations • Potential extension to San Quentin ferry terminal with I-580 bus link
North Bay (Marin – Solano)	<ul style="list-style-type: none"> • Napa-Solano rail services are developed connecting between SMART line and Capitol Corridor • Service operates with compliant equipment compatible with connecting lines 	<ul style="list-style-type: none"> • Corridor preservation plan 	<ul style="list-style-type: none"> • Corridor preservation plan 	<ul style="list-style-type: none"> • Consider as appropriate track, signal and station improvements to support initiation of Vallejo – Napa service • Consider as appropriate track, signal and station improvements to support initiation of east-west service between San Rafael and Fairfield/Vacaville with Napa Junction timed transfer • Consider as appropriate track signal and station improvements to extend north-south service to St. Helena

Corridor	Synopsis	Present – Year 2015	Year 2015 – Year 2030	Year 2030 – Year 2050
I-80 (Auburn – Oakland)	<ul style="list-style-type: none"> Capitol Corridor regional services between Auburn and San Jose extended to Roseville/Auburn with long-haul service to Reno/Sparks; capacity and operational improvements as well as new stations and grade separations are developed to support improved operation of corridor shared with high levels of freight traffic (Resolution 3434) Investments are made in UPRR main line between Port of Oakland and Nevada to support activities of Port of Oakland, California trade, and to allow long-haul freight service to be concentrated on the “Central Corridor” to free up other lines for regional passenger and freight movements Peplemover connection to new Capitol Corridor station at West Oakland Overlay services are provided operating on passenger tracks in the East Bay between Hercules and Oakland/Union City 	<ul style="list-style-type: none"> Third main track Oakland – Richmond Operational improvements to support expansion of service to Roseville/Auburn Hercules station Fairfield/Vacaville station Outer Harbor Intermodal Terminal and new freight leads (Port of Oakland) Donner Pass tunnel improvements to allow operation of double-stack freight movements 	<ul style="list-style-type: none"> Fourth main track Oakland – Richmond Relocate BNSF / UPRR junction from Stege to North Richmond <ul style="list-style-type: none"> wBART type service on UPRR (actual phasing to be determined by more detailed ridership and engineering analysis) Third main track Benicia – Auburn Dixon station Swanston station Peplemover connection to new Capitol Corridor station at West Oakland Bridge rehabilitation for Martinez and I Street bridges 	<ul style="list-style-type: none"> Revise passenger alignment Richmond – Ozol to add third track and improve operating speeds Bridge replacements at Martinez and I Street bridges

Corridor	Synopsis	Present – Year 2015	Year 2015 – Year 2030	Year 2030 – Year 2050
East Bay (Oakland – San Jose)	<ul style="list-style-type: none"> Capitol Corridor services are expanded and improved with capacity and operational improvements as well as new stations for services operating between Oakland and San Jose (Resolution 3434) Oakland Subdivision is purchased; passenger services are shifted to it south of Industrial Parkway in Hayward providing new intermodal with BART and Dumbarton at Union City Niles Subdivision is improved to handle all traffic between Oakland and South Hayward; the line becomes freight-only south of Industrial Parkway in Hayward Regional freight operates over existing UPRR lines between the Port of Oakland and Niles / Newark; in longer term, freight trains use Niles Subdivision south of Industrial Parkway in Hayward and former Southern Pacific through Niles Canyon 	<ul style="list-style-type: none"> Purchase Oakland Subdivision Restore track connection along Oakland Subdivision between Melrose (High Street, Oakland) and East Oakland yard for short haul freight (interim operations) Union City station, Shinn and Industrial connections and second track on Oakland Subdivision for passenger-only operation Hayward – Niles Second main track on Niles Subdivision Oakland-Hayward Second main track on Coast Subdivision Alviso – Santa Clara Construct separate passenger tracks within Niles Subdivision between South Hayward and 5th Avenue, Oakland 	<ul style="list-style-type: none"> Track, signal and grade separation improvements on Oakland Subdivision for passenger-only operation Union City – South Hayward Route freight traffic over Niles Subdivision between Oakland and Niles Junction, then either to and from the south via Warm Springs Subdivision to Milpitas or to and from the east via the former SPRR line through Niles Canyon 	<ul style="list-style-type: none"> Second main track on Coast Subdivision Newark – Alviso Extend third main track between Market Street and Jack London Square in Oakland; revise roadway configuration and waterfront access and circulation

Corridor	Synopsis	Present – Year 2015	Year 2015 – Year 2030	Year 2030 – Year 2050
Transbay (Oakland – San Francisco)	<ul style="list-style-type: none"> • BART Core Capacity improvements are accomplished to address Transbay demand in early years • Additional BART “Metro” provisions are implemented to increase service in core areas • In long term, new Transbay BART tube and San Francisco subway is developed to reduce demand on Market Street subway and to improve coverage in San Francisco • A four-track central segment is constructed to provide a conventional rail connection between Oakland and San Francisco; ultimately Caltrain and Capitol Corridor services may interline with signal improvements and revised regulations 	<ul style="list-style-type: none"> • BART Core Capacity improvements 	<ul style="list-style-type: none"> • BART Metro improvements (to be defined) 	<ul style="list-style-type: none"> • New BART Transbay crossing and San Francisco subway (alignment to be defined) • New standard rail Transbay crossing (service plan to be defined)
Peninsula (San Francisco – San Jose)	<ul style="list-style-type: none"> • Caltrain develops over time into a three and four track, grade separated, railway to support operation of lightweight electrified multiple-unit consists between San Francisco and Tamien Station in San Jose (Resolution 3434) • Service to Gilroy is handled with standard equipment shared with freight operating on Coast Subdivision 	<ul style="list-style-type: none"> • Grade separations and third/fourth main track 	<ul style="list-style-type: none"> • Grade separations and third/fourth main track • Electrification and lightweight EMU consists San Francisco – Tamien • Transbay transit center 	

Corridor	Synopsis	Present – Year 2015	Year 2015 – Year 2030	Year 2030 – Year 2050
South Counties (Santa Cruz, Monterey, San Benito)	<ul style="list-style-type: none"> Service between San Jose and Gilroy is extended to Salinas and Monterey; in longer term, when Peninsula converts to lightweight electrified equipment, the South Counties may be served by Capitol Corridor trains using standard equipment shared with freight on Coast Subdivision “Wharf to Wharf” service between Santa Cruz and Monterey is implemented using standard equipment connecting to the Salinas trains with timed transfers at Pajaro and Castroville A shuttle connection is provided between Gilroy and Hollister to meet all corridor trains 	<ul style="list-style-type: none"> Second main track San Jose – Gilroy Track, signal and station improvements to support service extensions to Salinas 	<ul style="list-style-type: none"> Modified service plan to serve San Jose – Salinas territory using standard equipment operating on the Colfax – San Jose line Line restoration, track and signal upgrades and stations to support Santa Cruz – Monterey service and Monterey corridor trains 	<ul style="list-style-type: none"> Track, signal and station improvements to support passenger shuttle to Hollister meeting all trains at Gilroy
Dumbarton (Redwood City – Union City)	<ul style="list-style-type: none"> Dumbarton Rail project is implemented (Resolution 3434) The service operates with standard equipment in the near term; separate passenger trackage is developed in the Centerville line over the longer term allowing operation of lightweight equipment between points along the Peninsula and the greater East Bay 	<ul style="list-style-type: none"> Bridge, track and signal improvements are made to support initiation of service between Redwood City and Union City across the Dumbarton Bridge 	<ul style="list-style-type: none"> Passenger only tracks constructed between Newark and Niles to allow operation of lightweight consists between Peninsula and East Bay 	

Corridor	Synopsis	Present – Year 2015	Year 2015 – Year 2030	Year 2030 – Year 2050
I-680 & Tri Valley (Contra Costa & Southern Alameda)	<ul style="list-style-type: none"> Near term investments are made to Oakland Subdivision to improve reliability of ACE services sharing with freights; in the longer term, sections of the former SPRR are put back into service west of Pleasanton allowing freights to be separated from passenger lines Regional bus services are developed in I-680 corridor connecting with regional rail An intermodal connection is made by extending BART to meet ACE in Pleasanton Regional freight operates between the San Joaquin Valley and Bay Area over the Altamont lines 	<ul style="list-style-type: none"> Track and signal improvements to Oakland Subdivision Niles – Tracy Regional bus in I-680 corridor 	<ul style="list-style-type: none"> Restore SPRR to service Niles – Hearst (Pleasanton); use to provide direct freight connection to Niles Subdivision Construct passenger-only tracks between Hearst (Pleasanton) – Vasco Road (Livermore) to improve reliability of operations Livermore BART extension and ACE intermodal Dublin/Pleasanton – Isabel/Stanley (actual phasing to be determined by more detailed ridership and engineering analysis) Extend eBART to Tracy with intermodal connection to ACE 	<ul style="list-style-type: none"> Construct second main track between Vasco Road (Livermore) and Lathrop to improve reliability of operations Track, signal and station improvements to West Side Line to extend service from Tracy to Patterson

Corridor	Synopsis	Present – Year 2015	Year 2015 – Year 2030	Year 2030 – Year 2050
Central Valley (Sacramento – Merced)	<ul style="list-style-type: none"> • ACE services are expanded in stages along a new passenger-only line constructed in phases along the UPRR Fresno Subdivision between Sacramento and Merced 	<ul style="list-style-type: none"> • R/W plan for Central Valley lines • Construct passenger-only line along UPRR Fresno Subdivision Stockton – 65th Street, Sacramento • Construct new passenger platforms for San Joaquin trains at Stockton diamond and provide rubber-tired shuttle to Channel Depot (Stockton) 	<ul style="list-style-type: none"> • Extend passenger-only line along UPRR Fresno Subdivision Lathrop – Modesto • Develop rail/rail grade separation between north-south UPRR line and east-west BNSF line in Stockton to improve capacity and operations; relocate UPRR and BNSF passenger platforms to crossing to provide vertical transfer 	<ul style="list-style-type: none"> • Extend passenger-only line along UPRR Fresno Subdivision Modesto – Merced
Grade Crossings and Grade Separations (All Lines)	<ul style="list-style-type: none"> • Staged, prioritized improvements are implemented in accordance with train and highway conflict levels to improve grade crossing safety • Implement “Quiet Zones” in the near term and to provide grade separations where needed in the long term 	<ul style="list-style-type: none"> • Grade separation studies to define improvements and required right-of-way (corridor specific) • Construct high priority grade separations along principal lines • Construct “Sealed Corridor” safety improvements and implement “Quiet Zones” along crossings which remain at grade 	<ul style="list-style-type: none"> • Construct second priority grade separations along principal lines 	<ul style="list-style-type: none"> • Construct grade separations needed for high speed operation along principal lines

8.3 Regional Rail with High-Speed Rail

8.3.1 Planning Context

The Regional Rail Plan effort was tasked with conducting a regionally-focused analysis of potential high-speed rail routes between the Bay Area and Central Valley. The study recommendations on the most promising high-speed rail alignments for Pacheco and Altamont Passes are formulated independently of the California High-Speed Rail Authority (CHSRA). The intent of this plan is to provide input to the CHSRA as it prepares its final environmental document for the Bay Area to Central Valley High-Speed Train Program. The CHSRA will ultimately decide on the preferred route for high-speed rail between the Bay Area and Central Valley. CHSRA has published a draft program-level environmental document which provides detailed information on potential impacts associated with a wide range of options under consideration in the region. The purpose of this section is to evaluate the high-speed rail options in the context of the recommended regional rail network absent high-speed rail including the benefits to the regional system which could occur with the addition of high-speed rail funding and service implementation.

CHSRA has indicated a willingness to support operation of regional operations which serve regional destinations over lines provided such services are operated with compatible equipment and additional improvements. These would include provision of four-track sections approaching and departing stations as well as additional and more complex train signaling allowing regional and statewide trains to operate in mixed-flow with statewide high-speed rail express trains.

The high-speed trains under consideration by CHSRA operate with lightweight electric equipment at speeds which are generally over 100 mph and with a top speed of 220 mph over lines which do not have any grade crossings. (Highest speeds would be attained in rural areas or other stretches of track which would be generally tangent and where operation at speeds up to 220 mph would not conflict with adjacent land uses.)

Such lines would be similar to the separate, passenger-only lines which were generally shown in Alternative 2. Whereas Alternative 1 was developed to operate up to 79 mph using standard equipment in which operations would be shared with freight traffic (and include grade crossings), Alternative 2 provides separate passenger-only trackage generally capable of speeds ranging up to and exceeding 110 mph depending upon the track alignment and adjacent land uses, with full grade-separation. Therefore, high-speed trains entering or operating within the Regional Rail network could operate over line segments evaluated in Alternative 2. The portions of Alternative 2 which were recommended for inclusion in the preferred Regional Rail network without high-speed rail include the Peninsula Corridor (San Francisco – San Jose) and the cross-bay connection via the Dumbarton Bridge to Union City.

In addition to stations served by some or all statewide high-speed rail trains, Alternative 2 includes a number of stops where only Regional Rail trains would stop. Additionally, whereas some statewide trains would stop at some of the Regional Rail stops, most regional trains would stop at all of these locations.

CHSRA has prepared an initial statement on potential system phasing. This report, which was presented to the High-Speed Rail Authority Board in May 2007, identifies a Phase 1 project extending from Anaheim to Los Angeles to Merced and the San Francisco Bay Area. In this context, a Central Valley segment extending to Merced (where the central yards and shops for the statewide network may be located) would be included in any Phase 1 project, along with a connection to the Bay Area to be identified. The phasing policy further defines the Bay Area connection to include “San Francisco, Oakland, or San Jose or any combination of those cities including all three cities” with the understanding that the selected Phase I segment will be further defined at the conclusion of EIR/EIS and after a preferred route or routes has been selected.

At the same time, it is important to recognize that CHSRA is committed to developing an ultimate network which would link all of California’s major metropolitan areas, including San Diego and Sacramento. From the perspective of the Northern California region, this means that a Sacramento connection via the Central Valley is included in the high-speed rail plan. As service to Sacramento is also a consideration for the Regional Rail Plan, the opportunity to support regional overlay services therefore extends beyond the inner bay area cities of San Francisco, Oakland and San Jose and would include, for example the ability to operate a regional service between Sacramento and Merced.

Finally, the CHSRA staging policy statement notes that local decisions to invest in regional corridors where high-speed rail may also provide service would provide opportunities for the CHSRA to leverage statewide funds with local investments to develop corridors for mutual benefit. In this regard, the policy statement specifically points to the Peninsula alignment:

“should the San Francisco to San Jose segment be identified and selected as part of the preferred alternative, including this segment in Phase I will enable the Authority to maximize the use of these resources and will help to reduce the need for state funds.” This is the same segment where the recommended Regional Rail Plan without High-Speed Rail identifies improvements to support operation of higher speed electrified trackage suitable for operation of multiple unit lightweight electric equipment with operational similarities to the statewide high-speed rail.

In summary, the following points emerge:

- Improvements to provide separate passenger-only regional rail trackage suitable for operation of lightweight equipment are most compatible with the high-speed rail system.
- Additional investments would need to be made to the lines to provide four track sections approaching and departing regional stops and where regional stops are themselves closely spaced, this may require development of extensive stretches of four track line.
- Even though the cost of supporting regional and statewide services on the same line would add to the development cost of either service separately, combined local and statewide funding would potentially be available – this additional level of funding would allow identified improvements to Bay Area segments to occur sooner with the addition of high-speed rail funding than might otherwise occur absent high-speed rail.
- The recommended Regional Rail network includes a “high-speed ready” line along the Peninsula from San

Francisco to San Jose as well as consideration for upgrading the Dumbarton project to provide trackage for lightweight regional trains operating between Union City and Peninsula destinations.

- The recommended phasing for High-Speed Rail will provide an initial investment in a segment in the Los Angeles area, a potential Central Valley segment between Bakersfield and Merced which could be used to demonstrate the 220-mph high-speed rail technology in addition to early investment in a selected Bay Area corridor. With further development of connections between the Bay Area and Central Valley segments, along with extension of the Central Valley segment to Sacramento, there would be numerous opportunities to support regional overlay services between Merced, Sacramento and the Bay Area in addition to operation of regional services within the Central Valley.

8.3.2 Ridership Analysis

The Regional Rail Plan ridership analysis considers the implementation of regional overlay services on the high-speed rail network. The ridership numbers were developed using the CHSRA “inter-regional model” which identifies travel into and through the MTC nine-county area from statewide locations. The regional market ridership was extracted from the model by identifying travel within and between five regional sub-markets served by high-speed rail with regional overlay services:

- Northern San Joaquin Valley – Composite inter-county ridership between Sacramento, San Joaquin, Stanislaus and Merced Counties which would be served by trains operating on 60-minute schedules

between Sacramento and Merced as well as Altamont trains operating on 30-/60-minute (directional) schedules between Sacramento or Merced and the Bay Area. This travel market comprises 5.3-million riders in Year 2030.

- Altamont / Tri-Valley – Composite ridership across Altamont Pass between the Northern San Joaquin Valley and Bay Area including travel between the Tri-Valley area and points west in the inner Bay Area which would be served by regional trains operating over Altamont and through the Tri-Valley. This travel market constitutes 5.7-million riders in Year 2030.
- South Counties – Ridership between counties located in the Association of Monterey Bay Area Governments district and south Santa Clara County to points north within the Bay Area which would be served by regional trains operating on 30-minute schedules from Gilroy north. This travel market would include 1.7-million riders in Year 2030.
- East Bay – Ridership across the Alameda / Santa Clara county screenline attracted to regional express trains operating on 30-minute schedules between Oakland and San Jose (the local travel market along the corridor would be served by BART.) This travel market would include 5-million riders in Year 2030.
- Peninsula – Ridership across the San Mateo / Santa Clara county screenline with 15-minute limited and/or express service (excepting local travel which would be attracted to Caltrain local services). This travel market would include 6.3-million riders in Year 2030.

Ridership figures were modeled with two-way branching of services between the Peninsula and East Bay as applicable; discounts were applied for three-way branching or alternatives serving only a portion of a travel market shed. In order to provide a consistent comparison to the CHSRA ridership estimates, the regional trips (e.g., No CA / No CA trips for the zone which includes all stops from Merced north) were added to the statewide trips (e.g., No CA / So CA trips to and from points from Fresno and south) to develop estimated systemwide ridership and total Northern Region ridership with express and regional services.

8.3.3 Cost Estimates

An independent evaluation of the cost of improving the corridors to support both statewide express service as well as regional services was prepared. Agreed-upon consistent unit costs were utilized in the CHSRA and Regional Rail capital cost estimating process. However, the Regional Rail figures are generally higher than the CHSRA figures due to the provision of additional stations and four-track sections.

For the purpose of developing a “cost per rider” figure, the capital cost estimate was annualized assuming a 50-year service life and 7 percent discount rate. The annualized capital cost was compared to the total Northern CA ridership figure (e.g., No CA / No CA trips plus No CA / So Ca trips.)

8.3.4 Regional Rail with High-speed Rail Entering from East (Altamont)

Tracy, Altamont and Tri Valley Segments

The recommended Regional Rail Plan without high-speed rail would provide substantial upgrades to the Altamont Pass and Tri Valley corridors to support higher frequencies, improved running times and fewer delays to ACE trains operating between the San Joaquin Valley and the inner Bay Area. The recommended Regional Rail Plan would also provide capacity improvements to the “Central Corridor” route north out of Oakland to Richmond and beyond such that transcontinental freight traffic could generally be shifted away from the Tri Valley and Altamont lines thereby reducing freight impacts to the ACE services and freeing up capacity to operate a short haul freight connection using shorter trains operated by a public entity.

CHSRA studied a number of sub-options extending from the Central Valley over Altamont Pass including four alternatives through Tracy and four through the Tri Valley area. For the purpose of the Regional Rail Plan, the key consideration in Tracy is providing an intermodal which allows a future opportunity for connections to an ultimate eBART extension as well as service to Patterson via the West Side line. Further to the west in the Tri Valley area, the Regional Rail Plan identifies a one-station extension of the BART Dublin/Pleasanton line to an intermodal at Isabel/Stanley as the lowest-cost solution to provide connectivity between BART and ACE. The Regional Rail Plan is not financially-constrained and accommodates this connection in the ultimate plan. In this context, the most consistent alignment through the Tri Valley area would enter via one of the Altamont alignments connecting with the UPRR corridor through

central Livermore to meet a future BART extension at the Isabel/Stamley location. This routing would avoid the need to modify I-580 to accommodate high-speed rail and would make a connection to BART by a more direct route between Altamont Pass and Pleasanton than options following I-580. CHSRA would need to obtain an agreement to use the UPRR right-of-way; however this corridor includes wide segments due to a prior consolidation of former Southern Pacific and Western Pacific rail lines in the Tri Valley. In closing, it should be noted that the CHSRA environmental document identifies the UPRR / downtown Tracy alignment as the “Base Case” for Altamont analysis.

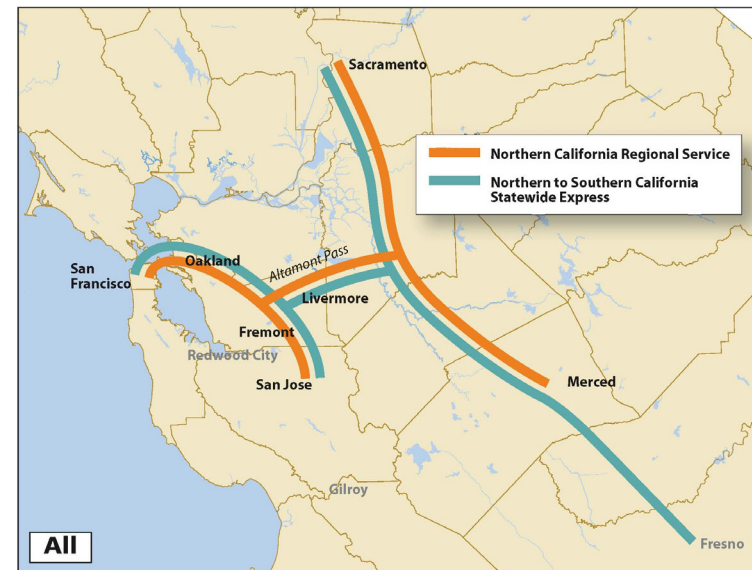
As the Regional Rail Plan envisions creation of the Livermore intermodal along with improving ACE services though investment in capacity and operational improvements along the route between Niles and Tracy, development of the corridor for high-speed rail service would provide an opportunity to develop a higher-speed passenger service where the market presently served by ACE is addressed with a regional overlay train operating along the high-speed rail alignment. Combined funding from regional and high-speed rail sources could accelerate these improvements. Regardless of high-speed rail some freight service would remain as this link is a key segment for regional freight mobility even though not located along the principal transcontinental lines extending north and east from Oakland. The combined requirement to accommodate high-speed rail while maintaining a freight connection could result in additional grade separations which would benefit highway and rail uses along with reducing community noise impacts.

Bay Area Segments

From Niles, where the high-speed rail alignment would reach the inner Bay Area, there are a number of combinations of improvements to reach Bay Area urban centers. Whereas the CHSRA EIS evaluates some 11 Altamont alternatives, this analysis focuses on three of the most promising options:

- San Jose, Oakland and San Francisco – via Transbay Tube
- San Francisco, Oakland and San Jose Termini
- San Francisco and San Jose via SF Peninsula (modified to include Oakland via Transbay Tube)

San Jose, Oakland and San Francisco – via Transbay Tube (“A11”)



This alternative branches at Fremont and provides direct service to San Jose and Oakland via the East Bay; San Francisco is reached via transbay tube from Oakland. This option would support regional services between the Central Valley and San Jose or Oakland/San Francisco as well as a regional express between Oakland and San Jose. The total cost of all Northern California segments including provisions for regional rail stations is estimated to be \$16-billion.

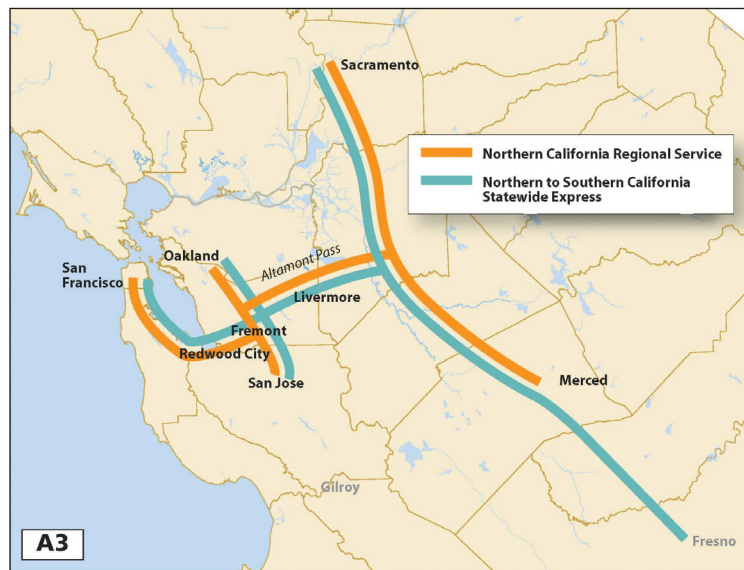
Considerations with this option include:

- Modified East Bay Alignment – This option would provide an East Bay connection between Fremont and San Jose. A direct connection via I-880 would be the least costly and would result in the fastest travel times, but a modified alignment with stops at I-880/Tasman and Trimble/North First (both with connections to VTA LRT) as well as at Santa Clara (with connection to San Jose Airport) costing about \$2.6-billion vs. \$1.9-billion for a direct line following I-880 would serve regional overlay services better. Regional stops on the Oakland leg would include Union City, Coliseum (Oakland Airport) and West Oakland, all with BART connections.
- Duplicate Investment – Commitments have already been made to improve Capitol Corridor service and to extend BART to San Jose but these improvements could not support high-speed rail service, which is on a different alignment. When fully developed, BART and Capitol Corridor will provide complementary rail options with BART serving more local stops and Capitol Corridor primarily serving regional stops. The capital cost of the East Bay line segment is approximately \$4.9-billion.
- Risk of UPRR Right-of-Way Agreement – Risk of reaching agreement from UPRR to obtain the right to construct high-speed rail along the Niles Subdivision where the high-speed alignment is proposed between Mission Boulevard and Oakland.
- Potential Environmental Justice Concerns – The environmental screening indicated potential concerns with construction of a new elevated alignment through existing urbanized areas especially in the East Bay between Fremont and Oakland.
- Ability to Improve ACE Service with High Speed Regional Train – This alternative would allow a train to be operated from Sacramento to San Jose via Altamont Pass, thereby resulting in a major service upgrade in the market area currently served by the Altamont Commuter Express.
- Construction within I-880 – The East Bay alignment segment south of Fremont would need to be constructed along I-880 freeway south of Mission Boulevard towards San Jose with the potential for a long process with Caltrans to define and construct the high speed rail trackway within the freeway right-of-way.
- Transbay Tunnel Schedule and Cost Risk – The travel analysis indicates the BART transbay lines will be heavily loaded even with planned improvements; therefore lack of direct service to San Francisco with implementation of statewide service was not considered viable. A long timeframe would be needed to deliver a new bay crossing considering the development of mitigation measures and approvals resulting in schedule risk that this segment could

not be available for service in conjunction with other segments.

There is also cost risk associated with tunneling. The Regional Rail Plan cost estimate of \$2.2-billion includes one half the cost of a four track sunken tube connection (the other 50% of the cost is assumed to be borne by a new BART connection.) The cost is based upon use of a sunken tube to provide a shallow entry into San Francisco to connect with the Transbay Transit Center. (A two-track deep bore tunnel connecting to 4th/King would cost about \$1.75-billion and would result in reduced impacts to San Francisco Bay compared to a sunken tube.)

San Francisco, Oakland and San Jose Termini (“A3”)



This alternative includes a three-way branch at Fremont and would provide direct service to San Jose and Oakland via the

East Bay as well as San Francisco via the Dumbarton Bridge, thereby avoiding the need for a transbay tube as provided in the “A11” option. This alternative would support regional services between the Central Valley and any of the three major Bay Area population centers as well as support operation of a regional express between Oakland and San Jose. The cost of all Northern California segments in this alternative is estimated to be \$17.7-billion; even though this alternative avoids a new Oakland – San Francisco tube, the total number of track miles required results in a higher total cost compared to the “A11” alternative.

Similar considerations to development of lines north of San Jose with respect to the Peninsula versus East Bay alignments would pertain to a high-speed service entering from the south via San Jose. These include (refer to details provided for Altamont alternative “A11”):

- Modified East Bay Alignment Fremont – San Jose
- Duplicate Investment with Respect to Capitol Corridor and BART
- Risk of UPRR Right-of-Way Agreement Fremont – Oakland
- Potential Environmental Justice Concerns in East Bay between Fremont and Oakland
- Ability to Improve ACE Service with High Speed Regional Train
- Construction within I-880

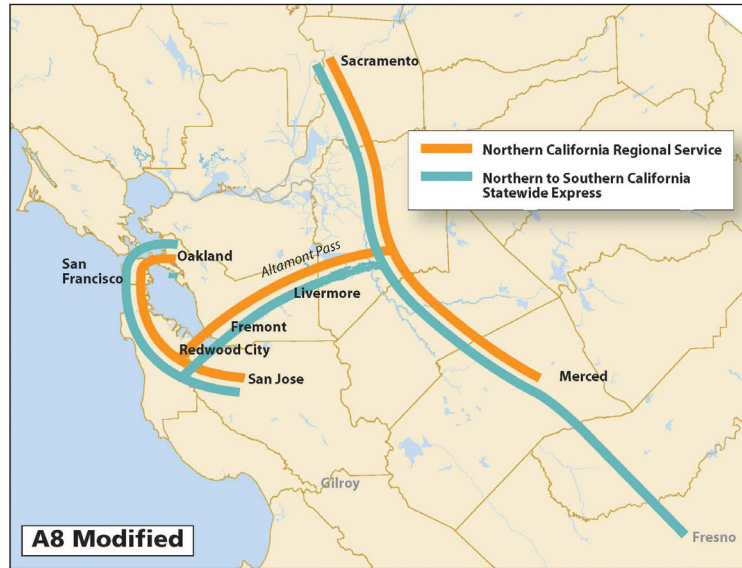
Additional considerations with this option include:

- **Dumbarton Crossing Schedule and Cost Risk** – Whereas the recommended Regional Rail Plan would provide separate passenger-only trackage between Redwood City and Union City using upgrades to the existing bridge, a high-speed rail main line suitable for carrying both statewide and regional services would require a new two-track high level bridge or tunnel connection across the Bay. Although a bridge crossing would be less costly than a tunnel, an extensive environmental process would be required to deliver a new Dumbarton crossing which would pass through environmentally sensitive areas including the Don Edwards National Wildlife Refuge. (The region successfully obtained environmental clearances for construction and/or reconstruction of major water crossings over the past two decades including new bridges across the Carquinez Strait at Benicia and Vallejo, as well as Bay Crossings including the Dumbarton Bridge replacement, the San Mateo Bridge widening, and Bay Bridge East Span replacement.) The cost of this crossing is estimated at about \$1.9-billion. It should be noted that if a suitable operating plan could be developed with 15- to 20- minute headways, the line could be operated with a single track bridge in the early years which would allow time for processing and construction of an improved span.
- **Reduced Opportunity for Cost Sharing on Peninsula** – This option would have an opportunity for cost sharing with Caltrain improvements on the Peninsula between Redwood City and San Francisco which is a segment estimated to cost \$3.9-billion. Because this option only shares with Regional Rail north of Redwood City on the Peninsula, there would be no opportunity to leverage local

investment in the Caltrain line between Redwood City and San Jose.

- **Problematic Operating Plan due to Three-Way Branch** – This alternative includes a three-way branch in service at Fremont for statewide and regional trains entering via Altamont Pass. The ridership forecasts indicate that splitting service three ways would significantly reduce ridership with a similar number of trains in operation due to reduced headways on each of the branches. This issue is considered a “near fatal flaw”. Service impacts could be addressed by omitting the leg to Oakland; however riders wishing to travel to Oakland would need to transfer to BART at Warm Springs or San Francisco. Omitting the Oakland leg would reduce the cost of this alternative from \$17.7-billion to \$15.5-billion.

San Francisco and San Jose via SF Peninsula with Oakland via Transbay Tube (“A8 Modified”)



This alternative is similar to the “A8” alternative identified in the CHSRA EIS except Oakland is served via transbay tube connection extending from San Francisco. This option would allow the San Francisco depot to operate as a “through” station thereby improving its capacity and by serving both San Francisco and Oakland on the same segment a three-way branch at Fremont would be avoided. The alternative would require branching at Redwood City and would provide direct service to San Jose and San Francisco; however trains to San Jose would operate via Redwood City. This option would support regional services between the Central Valley and the Peninsula as well as providing an opportunity to support additional enhancements to “Baby Bullet” service by with additional trains and improved speeds between San Francisco and San Jose.

Considerations with this option include:

- **Significantly Higher Peninsula Investment** – To support high-speed rail with existing and proposed services, the Peninsula corridor would need substantial additional investments including the provision of a minimum of three tracks between stations with four tracks through all station areas, requiring extensive use of subway or aerial trackage. The estimated cost of the Peninsula alignment in Regional Rail System Alternative 2, which reflects improvement to high speed rail standards, is approximately \$5.6-billion.
- **Compatibility with Caltrain on Peninsula and Opportunity for Cost Sharing** – The recommended regional rail plan includes improvements to the Peninsula line with fully separate passenger only trackage and operation of lightweight electrified equipment compatible with high-speed rail equipment. As a result, there would be an opportunity for the region to partner with CHSRA to accelerate and/or defray the cost of investments in the Peninsula line by leveraging local and statewide funding.
- **Opportunity for Incremental Improvement** – In anticipation of high-speed rail, four track sections and grade separations which are currently being developed could allow for the Peninsula to become “high-speed rail ready” from the present time forward. In the event the Federal Railroad Administration approves Caltrain’s application for a waiver to inter-operate compliant and non-compliant equipment, conversion of the Peninsula to become high speed rail ready would be facilitated as standard and lightweight equipment could be operated together until such time as the equipment would be fully changed over. Additionally, the transbay tube connection

to Oakland could potentially be omitted from a first statewide phase

- Dumbarton Crossing Schedule and Cost Risk – Whereas the recommended Regional Rail plan would provide separate passenger-only trackage between Redwood City and Union City using upgrades to the existing bridge, a high-speed rail main line suitable for carrying both statewide and regional services would require a new two-track high level bridge or tunnel connection across the Bay. Although a bridge crossing would be less costly than a tunnel, an extensive environmental process would be required to deliver a new Dumbarton crossing which would pass through environmentally sensitive areas including the Don Edwards National Wildlife Refuge. (The region successfully obtained environmental clearances for construction and/or reconstruction of major water crossings over the past two decades including new bridges across the Carquinez Strait at Benicia and Vallejo, as well as Bay Crossings including the Dumbarton Bridge replacement, the San Mateo Bridge widening, and Bay Bridge East Span replacement.) The cost of this crossing is estimated at about \$1.9-billion. It should be noted that if a suitable operating plan could be developed with 15- to 20- minute headways, the line could be operated with a single track bridge in the early years which would allow time for processing and construction of an improved span.
- Fremont Line Segment Impacts – Improvements would need to be made along the “Centerville” line across Fremont between Niles and Newark. One or two standard rail tracks would need to remain in place to serve ACE, Capitol Corridor and freight service making it difficult to

fit two high-speed rail tracks with four-track stations and approaches. A combination of right-of-way takes and grade separations would be required to fit all of the services into the corridor. Accordingly, the cost of this segment was estimated at \$300-million.

- Transbay Tunnel Schedule and Cost Risk – A long timeframe would be needed to deliver a new bay crossing considering the development of mitigation measures and approvals resulting in schedule risk that this segment could not be available for service in conjunction with other segments. However, this segment could be opened to service subsequent to an initial operating segment ending in San Francisco.

There is also cost risk associated with tunneling. The Regional Rail plan cost estimate of \$2.2-billion includes one half the cost of a four track sunken tube connection (the other 50% of the cost is assumed to be borne by a new BART connection.) The cost is based upon use of a sunken tube to provide a shallow entry into San Francisco to connect with the Transbay Transit Center. (A two-track deep bore tunnel connecting to 4th/King would cost about \$1.75-billion and would result in reduced impacts to San Francisco Bay compared to a sunken tube.)

Comparison of Altamont Pass Alternatives

Table 8.3.4-1 presents a summary comparison of the three most promising Altamont alternatives described in this section. As shown in the table, Alternative A8 (modified to include a transbay tube connection to provide direct service to Oakland) is identified as the preferred alternative with Alternative A3 listed as an option. “A8 modified” has generally lower cost and would serve generally more riders compared to the other two alternatives. It should be noted that “A3” could be modified to omit the Fremont – Oakland leg, resulting in a cost savings of \$2.2-billion and eliminating the three-way branch in service at Fremont; however, there would be no direct service to Oakland so this option does not provide equivalent service to “A8 modified”.

Between these three principal options, improving the Peninsula alignment to support high-speed rail end to end between San Francisco and San Jose as provided in alternative “A8 modified” would maximize the partnership opportunities with CHSRA, could be incrementally developed, provides consistency with existing plans and minimizes duplication with committed plans and investments.

The “A8 modified” alternative would require significant investment and would require following a potentially long environmental clearance process to clear and construct a crossing at Dumbarton; further project development and environmental effort would be required to obtain required rights-of-way and approvals for the entire segment back to a connection with the Central Valley line north of Merced, including at various “hard spots” where the right-of-way is restricted or where there may be impacts to adjacent land uses.

This option would support regional services operating with higher speed equipment between San Jose and San Francisco on the Peninsula as well as allow service to be provided between the Central Valley and Peninsula cities including San Francisco and San Jose.

Whereas the added capital cost of improving the estimated capital cost of the full Peninsula alignment upgrade between San Jose and San Francisco is about \$5.6-billion versus about \$4.9-billion for an East Bay alignment between San Jose and Oakland, extending the East Bay segment to San Francisco via a transbay tube connection would add as much as \$2.1-billion (assuming a one-half share of a four-track sunken tube shared with BART.).

By contrast, development of an East Bay option with direct service to San Jose and Oakland would include significant right-of-way risk gaining an agreement from UPRR to provide access to Oakland and would also require construction of a Transbay rail tunnel in order to serve San Francisco in the initial phase.

In the event this alternative would be selected, it would be appropriate to increase frequencies along the Capitol Corridor by increasing service to Great America – one way in which this could be accomplished would be by extending the Capitol Corridor overlay service between Hercules and Union City (refer to the recommended Regional Rail plan) to San Jose to allow for frequent transfers at Fremont.

Table 8.3.4-1
Comparison of Promising Altamont Pass Alternatives

	Capital Cost \$-Billion (2006)	Yearly Ridership (2030)				Cost Effectiveness (\$-Capital/ Regional Riders)	Express Travel Times SAC or LA to		
		No CA/ No CA	No CA/ So CA	No Ca Regional Subtotal	Statewide Including So CA		SF	OAK	SJ
A3 - San Francisco, Oakland & San Jose Termini (Option – See Comments)									
CHSRA	\$17.3	15.8	29.7	45.5	81.1	\$27.55	1:06/2:36	0:53/2:23	0:49/2:19
Regional Rail	\$17.7	16.1	29.7	45.8	81.4	\$28.02	--	--	--
A8 Modified - SF & SJ via Peninsula plus Oakland via Transbay Tube (Recommended)									
CHSRA	\$17.5	18.0	33.9	52.0	92.6	\$24.46	1:06/2:36	1:14/2:44	1:03/2:37
Regional Rail	\$16.7	19.9	33.9	53.8	94.5	\$22.46	--	--	--
A11 - San Jose, Oakland & San Francisco via Transbay Tube (Not Recommended)									
CHSRA	\$18.2	17.4	32.8	50.3	89.6	\$26.21	0:57/2:31	0:53/2:23	0:49/2:19
Regional Rail	\$16.0	19.0	32.8	51.8	91.2	\$22.38	--	--	--

Comments:

- The "A8 Modified" alternative (Peninsula line with long term Transbay Tube to Oakland) is recommended
- The "A8 Modified" alternative has generally lower capital cost and generally higher cost effectiveness than other options
- The "A3" alternative as defined would require a three-way branch at Niles Junction and would result in poor operating plans with reduced headways; it also conflicts with UPRR in East Bay
- An option to "A8 Modified" would be to construct the "A3" alternative without the Niles-Oakland leg to eliminate the three-way split at Niles Junction; the "A3 Option" as described would have lower cost and improved access to San Jose while avoiding conflicts with UPRR between Niles Junction and Oakland
- The "A11" alternative requires early construction of a Transbay Tube to reach San Francisco; with "A8 Modified" the tube could be deferred to save on early capital cost and reduce schedule risk

The composite East Bay / Peninsula option which could be developed by omitting the Fremont – Oakland leg from alternative “A3” with a Dumbarton and Peninsula connection to San Francisco and a direct line from Fremont to San Jose in the East Bay would save 18 minutes in travel time to San Jose, but would incorporate many of the risk and project delivery issues associated with both the Peninsula as well as East Bay alignments and would also not provide a logical routing for either a San Francisco – San Jose or Oakland – San Jose express train.

The recommended alternative “A8 (modified)” would not serve Oakland directly in the first phase. However, if BART were to be extended to an intermodal with the high-speed rail line in Livermore at Isabel/Stanley, Oakland passengers could transfer to BART and reach downtown Oakland in about 45 minutes time or access regional trains operating on the high-speed line in Fremont.

In the long term, a connection to Oakland could be provided by construction of a rail tunnel between San Francisco and Oakland thereby providing direct service to Oakland after a San Francisco stop. While construction of a new Bay Crossing at this location would require a long time for processing of environmental approvals and permitting, these issues are not considered to be fatal flaws.

Construction of a rail tunnel was estimated to cost about \$2-billion for a deep bore or \$3-billion for a sunken tube (total cost of a 2-track tunnel). A sunken tube would have more environmental impact than a bored tunnel and would cost less but would provide a more shallow profile capable of meeting the Transbay Transit Center directly. As the Regional Rail plan has identified the need for an additional BART crossing between Oakland and San Francisco in the long term, it would

be logical to provide a four track segment where BART and standard rail could be accommodated in a single structure (separate approaches for BART and standard rail would be required in San Francisco as well as the East Bay due to differing connectivity requirements. By combining high-speed rail and BART for part of the distance across the bay, a lower cost project would result compared to development of separate alignments.

Extending high-speed rail trains across the Bay from San Francisco to Oakland as through trains in the long term would provide additional operational benefits:

- Overnight storage, light maintenance and provisioning could be provided in Oakland. This would reduce required station dwell times in San Francisco thereby increasing the capacity of the station to accommodate higher levels of terminating Peninsula trains.
- A rail connection between San Francisco and Oakland could also be used to bring trains from the East Bay across to San Francisco. (In order to fully exploit this opportunity, additional consideration would need to be given to resolving the operational incompatibilities between standard Capitol Corridor type equipment versus the lightweight equipment associated with Caltrain and High-Speed Rail. Potential approaches to this issue would include obtaining waivers or ultimate rule revisions from the Federal Railroad Administration allowing for mixed flow of lightweight equipment along the East Bay passenger-only tracks operating with standard Capitol Corridor equipment.)

8.3.5 Regional Rail with High-Speed Rail Entering from South (Pacheco)

Central Valley Segments

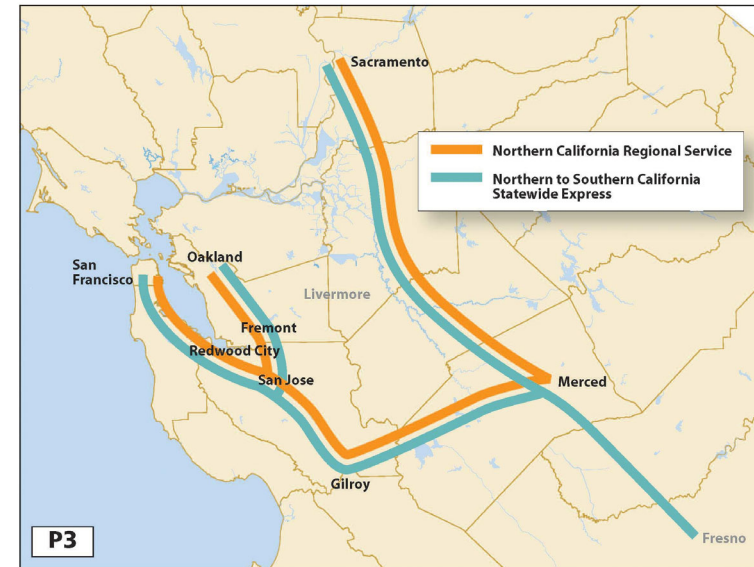
The environmental document prepared by CHSRA addresses design options for entering the South Bay from a point on the high-speed initial segment in the vicinity of Merced however from a regional rail perspective any Pacheco design option would enter the inner Bay Area following Monterey Highway and the existing UPRR Coast Subdivision north to Diridon Station in San Jose.

Bay Area Segments

The CHSRA EIS identifies some six alternatives for extending from San Jose into the Bay Area. The Regional Rail analysis compares two of the most promising options including the “P3” alternative which was previously adopted by MTC:

- San Francisco, Oakland & San Jose Termini
- San Jose, San Francisco & Oakland via Transbay Tube

San Francisco, Oakland & San Jose Termini (“P3”)



Pacheco Alternative “P3” would branch at San Jose and include a separate East Bay leg to Oakland and Peninsula leg to San Francisco. In doing so, no bay crossing would be required. However, construction of high speed rail trackage on both sides of the bay for the full distance between San Jose and San Francisco/Oakland would be very costly – the total cost of this alternative is estimated at \$18.1-billion.

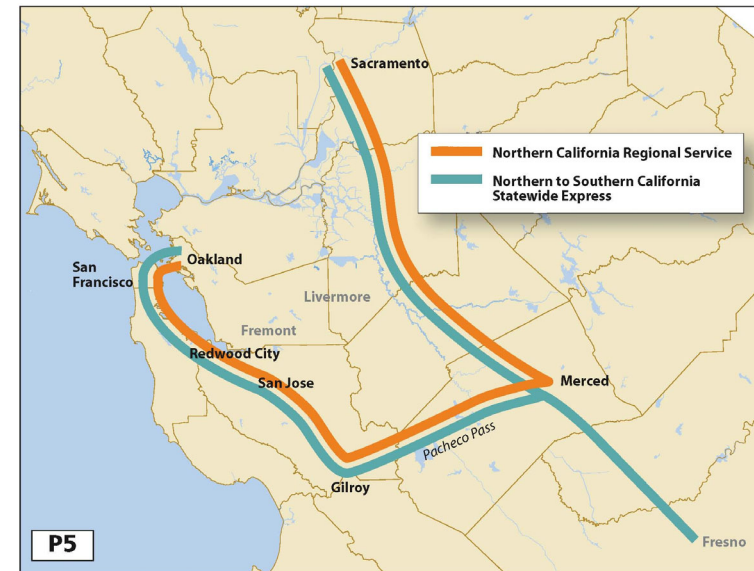
This alternative would support regional services operating San Francisco/San Jose on the Peninsula as well as Oakland/San Jose in the East Bay; in addition, regional trains could extend to the Northern San Joaquin Valley cities including Sacramento via Pacheco Pass.

Construction of a new high speed line in the East Bay would raise similar issues as were discussed for Altamont alternatives with East Bay segments. These include (refer to details provided for Altamont alternative “A11”:

- Modified East Bay Alignment Fremont – San Jose
- Duplicate Investment with Respect to Capitol Corridor and BART
- Risk of UPRR Right-of-Way Agreement Fremont – Oakland
- Potential Environmental Justice Concerns in East Bay between Fremont and Oakland
- Ability to Improve ACE Service with High Speed Regional Train
- Construction within I-880

Most importantly, by branching the line at San Jose, one of the most promising potential advantages of the Pacheco Pass alignment would be negated – namely the opportunity to operate all express trains on a single alignment as provided for in the “P5” alternative presented below. The branching of service at San Jose in alternative “P3” would lead to lower ridership levels given similar numbers of express trains operating to Southern California.

San Jose, San Francisco & Oakland via Transbay Tube (“P5”)



The “P5” alternative serves Oakland via transbay tube instead of providing a separate East Bay alignment. The tube could be developed as a joint project in conjunction with a new BART connection and four track central section. Even with a transbay tube connection, Alternative “P5” would have lower total cost, estimated at \$16.1-billion, compared to the “P3” alternative.

This alternative would support regional services operating San Francisco/San Jose on the Peninsula with regional trains extended to the Northern San Joaquin Valley cities including Sacramento via Pacheco Pass.

Alternative “P5” would avoid the issues identified for Alternatives “P3” and “A11” with respect to the East Bay.

It would include issues associated with construction of a new transbay tube San Francisco – Oakland as discussed previously for Altamont Alternative “A8 Modified”. Similar to the “A8 Modified” alternative, construction of the tube could be deferred to a future phase to mitigate cost and schedule risk.

Table 7.3.5-1 presents a comparison of cost and ridership data for the two Pacheco alternatives. As shown The "P5" alternative is recommended as it has lower capital cost and higher cost effectiveness compared to alternative "P3". Additionally, “P5” has a superior operating plan - with all three major cities on a single line, service levels are maximized.

8.3.6 Comparison of Altamont vs. Pacheco

Table 8.3.6-1 presents a comparison of the recommended Altamont and Pacheco alternatives, “A8 Modified” and “P5”.

As shown, the only ridership statistics which are significantly differentiated are the trips within or served along the two corridors, in which Altamont is 135 percent higher than Pacheco; Northern California regional trips (representing all trips with origins and destinations from Merced north), in which Altamont again exceeds Pacheco by 26 to 36 percent; and Northern California to Southern California trips (e.g., trips from Merced and north to Fresno and south), in which Pacheco exceeds Altamont by 18%. This analysis clearly distinguishes that Altamont provides better regional service and Pacheco provides better express service overall.

Whereas there are small differences in cost and cost-effectiveness, the marginal advantages shown for Pacheco are not significant.

With respect to travel times (refer back to Tables 8.3.4-1 and 8.3.5-1), trips between San Francisco and San Jose and northern San Joaquin Valley points would be substantially longer with Pacheco compared to Altamont. (E.g., travel time between San Francisco and Sacramento would be 1:47 via Pacheco versus 1:06 minutes via Altamont for a savings of 41 minutes.)

On the other hand, with a Pacheco alignment, travel times between San Jose and Southern California and the Central San Joaquin Valley would be nearly one-half hour less than the Altamont alignment (e.g., Los Angeles to San Jose travel times of 2:09 vs. 2:37) and all trains would operate on a single route with no branches in service resulting in the highest number of statewide trains stopping at all destinations in the Bay Area.

Table 8.3.5-1
Comparison of Promising Pacheco Pass Alternatives

	Capital Cost \$-Billion (2006)	Yearly Ridership (2030)				Cost Effectiveness (\$-Capital/ Regional Riders)	Express Travel Times SAC or LA to		
		No CA/ No CA	No CA/ So CA	No Ca Regional Subtotal	Statewide Including So CA		SF	OAK	SJ
P3 – San Francisco, Oakland & San Jose Termini (Not Recommended)									
CHSRA	\$17.4	11.8	35.7	47.5	85.5	\$26.48	1:47/2:38	1:38/2:30	1:18/2:09
Regional Rail	\$18.1	14.4	35.7	50.1	92.7	\$26.22	--	--	--
P5 – San Jose, San Francisco & Oakland via Transbay Tube(Recommended)									
CHSRA	\$17.3	13.2	40.0	53.2	95.8	\$23.61	1:47/2:38	1:53/2:46	1:18/2:09
Regional Rail	\$16.1	15.8	40.0	55.8	98.4	\$20.87	--	--	--

Comments:

- The "P5" alternative is recommended
- The "P5" alternative has lower capital cost and higher cost effectiveness compared to alternative "P3"
- This alternative has a superior operating plan - with all three major cities on a single line, service levels are maximized
- This alternative maximizes the ability to match high speed rail funding with regional commitments to the Caltrain line
- This alternative avoids duplication of investment between the Peninsula and East Bay
- This alternative avoids the UPRR East Bay right-of-way

Table 8.3.6-1

Comparison of Recommended Altamont Pass Alternative to Recommended Pacheco Pass Alternative

	<u>Altamont</u> (A8 Modified)	<u>Pacheco</u> (P5)	Margin	Best Option
Ridership Comparison (Millions-Yearly 2030)				
Northern California Regional Trips				
CHSRA	18.0	13.2	36%	Altamont Higher
Regional Rail	19.9	15.8	26%	Altamont Higher
Northern CA to Southern CA Trips				
CHSRA	33.9	40.0	18%	Pacheco Higher
No CA Regional Trips + No CA / So CA Trips				
CHSRA	52.0	53.2	2%	Pacheco Marginally Higher
Regional Rail	53.8	55.8	4%	Pacheco Marginally Higher
Southern CA Trips				
CHSRA	40.7	42.6	5%	Pacheco Marginally Higher
Systemwide Trips				
CHSRA	92.6	95.8	3%	Pacheco Marginally Higher
Regional Rail	94.5	98.4	4%	Pacheco Marginally Higher
Year 2006 Capital Cost (\$-Billion)				
CHSRA	\$17.5	\$17.3	(1%)	Pacheco Marginally Lower
Regional Rail	\$16.7	\$16.1	(4%)	Pacheco Marginally Lower
Cost Effectiveness (Capital \$/All No CA Trips)				
CHSRA	\$24.46	\$23.61	(3%)	Pacheco Marginally Lower
Regional Rail	\$22.46	\$20.87	(7%)	Pacheco Marginally Lower

8.3.7 Altamont Alignment with Pacheco Alignment

Given that the Altamont and Pacheco alignments have different advantages, there is some consideration for combining the two alternatives and providing trackage in both corridors. If this were to be done, each of the two corridors (e.g., Altamont between northern San Joaquin Valley and the Dumbarton crossing to Redwood City and Pacheco between northern San Joaquin Valley and San Jose) could be developed with only two tracks.

Although the cost savings would be marginal – about \$650-million – the benefit of a reduced right-of-way requirement could materially reduce impacts where the high speed line would need to be fitted into existing urbanized areas by tailoring the alignments. The Pacheco Pass alignment would be designed for highest possible speeds as two-track alignment utilized by trains operating to and from Southern California and the Altamont Pass alignment would be designed for speeds approaching the Pacheco and Central Valley segments were feasible but with two tracks and regularly-spaced regional stops.

Three such combination alternatives have been identified and compared:

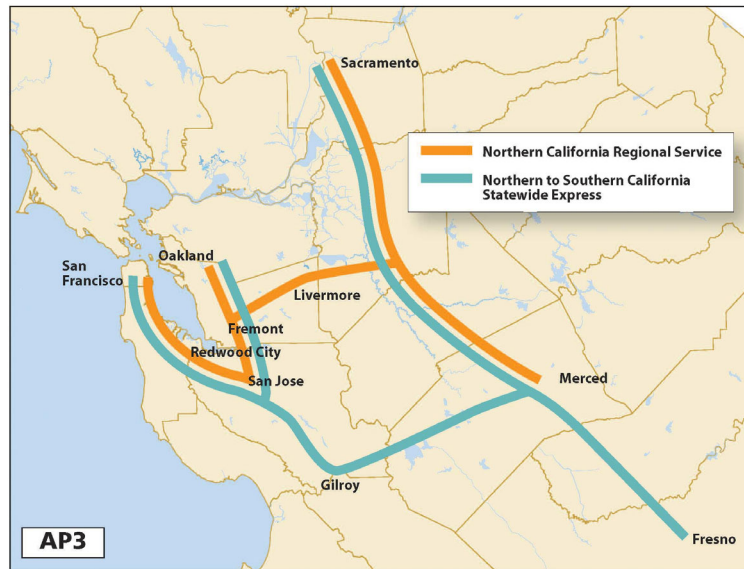
- San Francisco & SJ via Peninsula plus Oakland via Transbay Tube (“AP1 Modified”)
- SF, Oakland & SJ Termini without Dumbarton Bridge (“AP3”)
- San Francisco, Oakland & San Jose Termini with Dumbarton Bridge (“AP5”)

San Francisco & SJ via Peninsula plus Oakland via Transbay Tube (“AP1”)



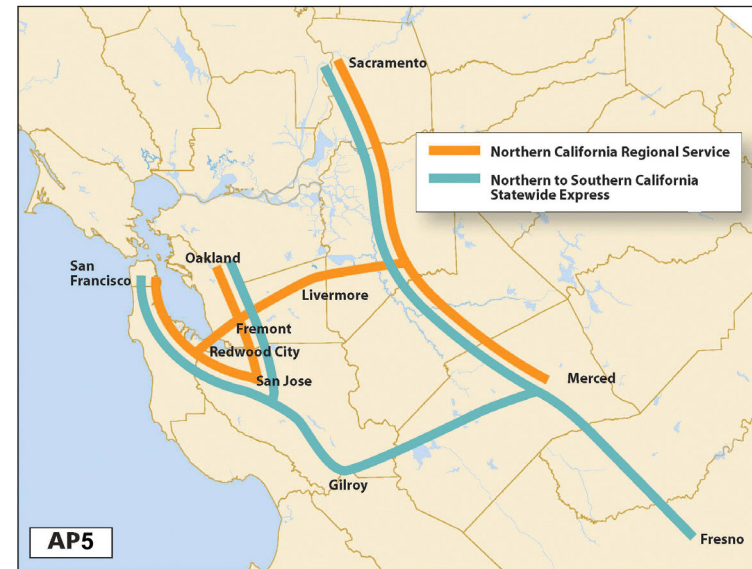
This alternative would include a two-track Altamont alignment and would only include two tracks between San Jose and Gilroy. With only regional trains operating over the Dumbarton Bridge, it would not be necessary to provide a high bridge at this location. This alternative is modified from the CHSRA “AP1” alternative to include a transbay tube connection to Oakland which would allow southern California express trains to serve all three major Bay Area population centers without splitting the service. The transbay tube could be deferred to a future phase to reduce near term cost and speed project delivery. The total cost of this alternative would be \$21.2-billion, representing a savings of more than \$1-billion from “A8 Modified” plus “P5” combined.

SF, Oakland & SJ Termini without Dumbarton Bridge (“AP3”)



This alternative would have the same characteristics as the “AP1” option with respect to trackage entering the Bay Area from both Altamont and Pacheco. Without a bay crossing, Altamont trains would need to travel down to San Jose to reach Peninsula destinations. In addition, Southern California express trains would need to branch at San Jose resulting in increased headways for express trains bound to San Francisco and Oakland. Other drawbacks identified with development of a new Oakland – San Jose high-speed line would pertain to this alternative (such as conflicts with the UPRR, the need to develop the line along I-880, and potential environmental justice concerns.) The cost of this alternative is estimated at \$22.1-billion.

San Francisco, Oakland & San Jose Termini with Dumbarton Bridge (“AP5”)



This alternative would be similar to “AP3” except it would include a single-track low bridge at Dumbarton to provide better service to the San Francisco peninsula from Altamont. This option would also incorporate two-track sections south of Gilroy and east of Redwood City similar to the other Altamont + Pacheco alternatives. The negatives with this alignment would include the issues developing a new rail line in the East Bay as well as a three-way split of regional trains at Fremont resulting in reduced headways and ridership for trains using Altamont Pass. The cost of this alternative is estimated at \$23.3-billion.

Comparison of Altamont + Pacheco Options

Table 8.3.7-1 presents comparative ridership and cost data for the Altamont + Pacheco alternatives. As noted, “AP1 Modified” is the preferred option. This alternative, which is consistent with both the “A8 Modified” Altamont alignment as well as the “P5” Pacheco alignment has generally lower cost and generally higher ridership than the other two options. The “AP1 Modified” alternative is stageable from either the recommended “P5” or “A8 Modified” alternatives by adding either the regional track (Altamont) or express track (Pacheco) later.

Alternative “AP3” would require express trains to split between Oakland and San Francisco and would also give poor regional access to San Francisco due to lack of water crossing.

Alternative “AP5” would also require regional trains entering through Altamont to be split three ways at Niles between Oakland, San Francisco and San Jose

Both “AP3” and “AP5” (similar to AP3 with a Dumbarton Bridge) would result in duplicate investment in an East Bay line which would conflict with UPRR.

Table 8.3.7-2 presents a three-way comparison of Altamont + Pacheco options to the recommended Altamont “A8 Modified” and Pacheco “P5” alternatives.

On aggregate ridership evaluations, the recommended Altamont + Pacheco alternative “AP1 Modified” performs the highest; Altamont by itself focuses more service on Northern California regional trips and slightly out-performs the Altamont + Pacheco option. Likewise, Pacheco by itself is

slightly higher in serving trips to Southern California as more service is concentrated on Pacheco Pass with a Pacheco-only option. However, as shown, for total regional trips and for systemwide travel, Altamont + Pacheco yields the highest ridership numbers.

With respect to cost and cost-effectiveness, Pacheco by itself would cost less than an aggregate Altamont + Pacheco alternative and would be lower in terms of cost per rider. However, as noted previously, the combination alternative includes savings of about \$1-billion compared to an option which includes 4-tracks and a high bridge in the Altamont corridor.

Table 8.3.7-1
Comparison of Altamont + Pacheco Alternatives

	Capital Cost \$-Billion (2006)	Yearly Ridership (2030)				Cost Effectiveness (\$-Capital/ Regional Riders)	Express Travel Times SAC or LA to		
		No CA/ No CA	No CA/ So CA	No Ca Regional Subtotal	Statewide Including So CA		SF	Oak	SJ
AP1 Modified - San Francisco & SJ via Peninsula plus Oakland via Transbay Tube (Recommended)									
CHSRA	\$22.5	17.8	36.8	54.6	98.0	\$29.84	1:15/2:45	1:23/2:53	0:56/2:26
Regional Rail	\$21.2	19.9	36.8	56.7	100.1	\$27.09	--	--	--
AP3 – SF, Oakland & SJ Termini without Dumbarton Bridge (Not Recommended)									
CHSRA	\$22.0	15.9	33.0	48.9	87.8	\$32.61	1:48/2:45	1:00/2:30	0:56/2:26
Regional Rail	\$22.1	18.2	33.0	51.2	98.0	\$31.35	--	--	--
AP5 – San Francisco, Oakland & San Jose Termini with Dumbarton Bridge (Not Recommended)									
CHSRA	\$23.1	16.9	34.9	51.8	92.9	\$32.37	1:15/2:45	1:00/2:30	0:56/2:26
Regional Rail	\$23.3	20.1	34.9	55.0	96.1	\$30.65	--	--	--

Comments:

- The "AP1 Modified" alternative (AP1 with long term Transbay Tube to Oakland) is recommended; this alternative has generally lower capital cost and generally higher cost effectiveness than other options
- The "AP1 Modified" alternative is stageable from either the recommended "P5" or "A8 Modified" alternatives by adding either the regional track (Altamont) or express track (Pacheco) later
- Alternative "AP3" would require express trains to split between Oakland and San Francisco and would also gives poor regional access to San Francisco due to lack of water crossing
- Both "AP3" and "AP5" (similar to AP3 with a Dumbarton Bridge) would result in duplicate investment in an East Bay line which would conflict with UPRR
- Alternative "AP5" would also require regional trains entering through Altamont to be split three ways at Niles between Oakland, San Francisco and San Jose

Table 8.3.7-2

Comparison of Altamont + Pacheco to Altamont or Pacheco

	<u>Altamont</u> (A8 Modified)	<u>Pacheco</u> (P5)	<u>Altamont + Pacheco</u> (AP1 Modified)	
Ridership Comparison (Millions-Yearly 2030)				
Northern California Regional Trips				
CHSRA	18.0	13.2	17.8	Altamont Higher
Regional Rail	19.9	15.8	19.9	Altamont + Pacheco or Altamont Equivalent
Northern CA to Southern CA Trips				
CHSRA	33.9	40.0	36.8	Pacheco Highest
No CA Regional Trips + No CA / So CA Trips				
CHSRA	52.0	53.2	54.6	Altamont + Pacheco Highest
Regional Rail	53.8	55.8	56.7	Altamont + Pacheco Highest
Southern CA Trips				
CHSRA	40.7	42.6	43.4	Altamont + Pacheco Highest
Systemwide Trips				
CHSRA	92.6	95.8	98.0	Altamont + Pacheco Highest
Regional Rail	94.5	98.4	100.1	Altamont + Pacheco Highest
Year 2006 Capital Cost (\$-Billion)				
CHSRA	\$17.5	\$17.3	\$22.48	Pacheco Lowest
Regional Rail	\$16.7	\$16.1	\$21.20	Pacheco Lowest
Cost Effectiveness (Capital \$/All No CA Trips)				
CHSRA	\$24.46	\$23.61	\$29.84	Pacheco Lowest
Regional Rail	\$22.46	\$20.87	\$27.09	Pacheco Lowest

8.3.8 Implementation of High-Speed Rail

There are a number of ways in which various high-speed rail segments could be implemented within Northern California. A project of the magnitude of high-speed rail would take a number of years to deliver from the point of view of environmental clearance, permitting and construction, regardless of funding availability. Given these unknowns, as well as choices regarding specific route alternatives, it is difficult to specify a sequencing of segments at this point in time. Any sequencing which would be developed should, if possible, take into account the ability to utilize portions of the completed network as soon as possible, regardless of the availability of the entire network.

Initial Bay Area Segment

Clearly the San Francisco Peninsula is a location which could be improved with or without high speed rail. In accordance with both the phasing policy of CHSRA as well as the recommended Regional Rail options is improvement of the Peninsula corridor to make it “high-speed ready” for operation as a grade-separated, higher speed alignment suitable for use of electric multiple unit equipment. High-Speed rail limited stop trains could serve Peninsula destinations as a regional overlay to the long distance trains along with continued operation of local services.

Possible Altamont Pass Improvements (“A8 Modified”)

- **Early Elements** – As the Regional Rail Plan recommends upgrade of the Dumbarton service to provide a separate track connection for lightweight equipment between Redwood City and Union City, this segment would be electrified to support high speed rail equipment. An initial

two-track high-speed line would be developed through the Tri Valley area physically separated from the standard rail line, potentially using the abandoned Southern Pacific alignment to defer construction of a tunnel under Niles Canyon. A new 2-track high-speed alignment would be developed over Altamont Pass connecting to the preferred alignment segment in the Central Valley.

- **Later Elements** – In order to support higher frequencies of train operation and to provide higher speed operation of express trains, the Altamont alignment would be expanded to a full 4-track section at all stations, a tunnel would be constructed beneath Niles Canyon, and a new high bridge would be constructed at the Dumbarton Bay Crossing. (Optionally, marina uses south of Dumbarton would be closed and the waterway de-certified for navigation allowing a fixed 2-track low bridge to be constructed.) In addition, BART would be extended to Isabel/Stanley providing a connection to Oakland.

Possible Pacheco Pass Improvements (“P5”)

- **Early Elements** – A two-track Pacheco Pass alignment would be constructed between San Jose and the statewide line south of Merced allowing high speed trains to operate between Southern California and San Jose / San Francisco via the Peninsula line. In order to enhance regional service in the East Bay and Northern San Joaquin Valley, improvements to the ACE line would be accelerated.
- **Later Elements** – In order to accommodate statewide express and regional trains between San Francisco and regional points south of San Jose, four-track station sections would be constructed between San Jose and Gilroy and an improved intermodal station would be

provided at Gilroy to allow South County travelers convenient access to high speed express and regional trains. In the East Bay, BART would be extended to Isabel/Stanley to provide better regional connections between the Northern San Joaquin Valley and East Bay.

Possible Altamont + Pacheco Pass Improvements (“AP1 Modified”)

In the event both the Altamont and Pacheco alignments were included in the high-speed rail network, an even broader set of segments would be available and there would be more choices for advancing individual projects on either or both alignments depending upon funding and priorities.

- **Potential Early Altamont Elements** – The single track Dumbarton Bridge line would be electrified to Fremont to initiate service with an improved bridge connection deferred to Phase 3. An initial two-track high-speed line would be developed through the Tri Valley area physically separated from the standard rail line, potentially using the abandoned Southern Pacific alignment to defer construction of a tunnel under Niles Canyon until Phase 3. A new 2-track high-speed alignment would be developed over Altamont Pass connecting to the preferred alignment segment in the Central Valley.
- **Potential Early Pacheco Elements** – A two-track Pacheco Pass alignment would be constructed between San Jose and the statewide line south of Merced allowing high speed trains to operate between Southern California and San Jose / San Francisco via the Peninsula line.

Potential Later Improvements

Deferred Altamont improvements with an Altamont + Pacheco alternative such as new Dumbarton Bridge or tunnel under Niles Canyon would be constructed.

Build-out of high-speed rail in Northern California would be completed with construction of a transbay tunnel connection extending the Peninsula line from San Francisco to Oakland. This line segment could be developed as part of a four-track tube also serving BART. Construction of the tunnel connection would improve operations at the San Francisco terminal and would provide direct service to Oakland with an intermodal connection to Capitol Corridor and BART at West Oakland. The connection could also provide access to potential storage tracks located along I-880.

Summary

A recommendation regarding selection of an Altamont alignment versus a Pacheco alignment is a policy issue for the responsible elected and appointed officials to consider. The Regional Rail Plan analysis does provide information on the cost, ridership, and other issues relative to either of the two alignments to inform that policy discussion.

9.0 Support Strategies

9.1 Land Use Strategy

By 2050, the Bay Area will add 40 percent more residents, San Joaquin County's population will more than triple, and Sacramento County will grow 132 percent. It is imperative that our regions continue to plan and focus our growth and development in core areas; produce quality, higher density housing (particularly affordable housing) for our residents; and make tighter connections between our land-uses and transportation infrastructure.

Our commitment to implementing smarter growth policies has not wavered since the establishment of the Regional Smart Growth Vision in 2002. Revitalization of central cities and older suburbs, greater support and use of public transit, promotion of bicycling and walking, and preservation of open space and agricultural lands remain top priorities for the region. In this vein, the Regional Rail Plan calls for a comprehensive land-use strategy that optimizes on opportunities to better plan and provide for supportive land-uses at rail stations, at key connectivity points, and along rail corridors.

Opportunities to Link Land-Use and Rail Investments

Transportation and land-use function as one integrated system. Yet, too often, planning for the two are disconnected. Better planning will help to meet some of the region's most pressing needs to create walkable communities with homes for people of all incomes, reduce our greenhouse gas emissions,

provide congestion relief, and reduce the need to develop on our remaining open spaces.

Well-planned neighborhoods around transit stations can create financial savings for individuals and the region. Taxpayers also save when transit agencies generate more money from the farebox and require lower subsidies. Cities benefit from increased sales tax revenue from the stores that are typically part of mixed-use developments.

Over the past six years, regional agencies have acknowledged the potential to refocus growth into existing areas, primarily around transit, and are developing policies and programs to help make that happen. This potential certainly exists. The Bay Area is fortunate to have a strong existing network of rail, ferries, and major bus corridors. There are at least 305 existing stations and more almost every year. Between 2000 and 2004, furthermore, Bay Area voters supported \$12 billion in new transit investments that are catalyzing the next generation of rail expansions.

There are, however, considerable barriers to transit-oriented development such as the complex financing and land assembly process, existing zoning that precludes the required mix of uses and density, and the challenge of interagency coordination often required. Additionally, planning staffs are often stretched thin, and may not have the expertise, political support, or financial resources to work with developers to plan, finance and build transit-oriented developments.

The half-mile around the transit station is often seen as the most critical. This is the area within which people can walk to the station or from the station to their destinations. MTC's analysis of its 2000 Bay Area Transportation Survey found that in the Bay Area people who live and work within a half-mile of a rail station are four times more likely to use transit on a daily basis than people who neither work nor live near transit. People who both live in or work within half a mile of a rail stop use transit for 42 percent of their work trips, 10 times more than the region according to MTC's September 2006 study: Characteristics of Rail and Ferry Station Area Residents.

Existing Land-Use Policies

Bay Area agencies have developed several innovative policies and programs that offer a solid foundation for the Regional Rail Plan.

- MTC's Transit Oriented Development (TOD) Policy applies to transit extension projects funded by regional discretionary money. Each transit extension project funded in Resolution 3434 must plan for a minimum number of housing units around the station area and/or along the corridor.
- BART's System Expansion Policy relies on agreements between BART and local jurisdictions regarding the achievement of ridership thresholds.
- The California High-Speed Rail Authority has adopted land use principles that include high density, a mix of land uses, grid street pattern and pedestrian-oriented design, and parking limits. At this time, they are preparing more detailed station area development policies and plans.

- MTC has also pioneered a range of programs, including its award-winning Transportation for Livable Communities (TLC) Program, Housing Incentive Program (HIP), Safe Routes to Transit, and Station Area Planning Grants, to assist with planning and implementation of transit-oriented development, many of which have been emulated around the country.
- Four regional agencies – MTC, Association of Bay Area Governments (ABAG), the Bay Area Air Quality Management District (BAAQMD), and the Bay Conservation and Development Commission (BCDC) – are working on the “Focusing our Vision,” or FOCUS effort, in concert with county congestion management agencies, transit providers and local governments throughout the Bay Area, to continue implementation of the 2002 Regional Smart Growth Vision.

FOCUS seeks to strengthen existing city centers, locate more housing near existing and future rail stations and quality bus lines, encourage more compact and walkable suburbs, and protect regional open space. Current efforts involve working with local governments to identify priority development area (PDAs) that are accommodating growth through mixed use and infill development near transit and job centers, with an emphasis on housing.

The initial 2007 call for applications resulted in submittals by 50 Bay Area communities for over 100 priority development areas. In aggregate, these areas represent the majority of the region's communities with existing rail or planned rail stations via Resolution 3434. The number of applications suggests that many Bay Area communities are ready to focus growth in transit-served neighborhoods and secure the resources and tools to do so.

Regional Rail Plan Considerations

The Bay Area has been an innovator with land-use policies for transit investments. Still, there is a need to not only expand existing approaches, but also encourage use of as many new strategies as possible to ensure that the region's economy, environment, and people all benefit from our land-use and transportation decisions. Importantly, rail project implementation must be fully integrated with supportive land-uses in order to establish the ridership markets that will be needed to justify these hefty investments. Further integrating this plan with regional efforts such as FOCUS is key to realizing the greatest benefits for the Bay Area.

While land-use authority remains the prerogative of local governments, *agencies involved in the Regional Rail Plan should integrate land-use into decision-making regarding where, when, and how to expand and improve our rail system.* The following are the key considerations to enhance existing programs:

1. Monitor, Update and Expand Rail Station TOD Policies

Ridership studies continue to validate the immense importance of the half-mile radius surrounding stations, both as origins for people who live nearby, and as destinations for jobs, education, recreation or services. To ensure a strong transportation and land-use links:

- Conduct ongoing evaluation of MTC's existing land-use policy using the latest information about land use determinants on ridership, and strengthen the policy where appropriate.
- Any new rail expansion projects considered in this plan using public funds should be subject to

existing or updated MTC, BART and CHSRA policies.

- Encourage more local governments to nominate their community for designation of FOCUS priority development areas (i.e., planning for more housing growth around current and planned station areas) so that they may leverage state/regional resources to maintain the necessary infrastructure and support transit use.
- Support FOCUS priority development areas by expanding the capacity and improving the quality and efficiency of the region's existing rail system.
- Through FOCUS and other forums develop a collaborative approach between regional agencies, transit operators, and local governments to help identify the transit supportive land uses to be built within a half-mile of transit stations and foster changes to local zoning ordinances to implement these uses.

2. Adopt Ridership Development Plans for the Broader Commute Shed

Individual transit agencies should adopt the collaborative nature of BART's ridership development process, which looks beyond the half-mile radius to the larger "commute shed." There should be a special emphasis on ensuring transit supportive land uses on major corridors that are adjacent to or feed into the transit station. These plans should be funded as part of the projects.

3. Seek State Bond Monies for Infill and Transit-Oriented Development:

Proposition 1C and Proposition 84 were approved by voters in November

2006. Included within these propositions are accounts that can be used to support infill and transit-oriented development that the region is seeking to support through FOCUS. Since there is no assurance on that our region will have a say in how these monies are allocated, legislative advocacy will be required to ensure that the Bay Area's interests are represented in trailer bills for both propositions.

4. *Expand the Resources Available to Help Cities*

Bay Area communities that are proactively pursuing transit-oriented developments often need technical assistance or funding to perform market analyses, prepare economic strategies, or broaden community outreach and involvement in the local planning processes.

While the Bay Area has been a leader through programs such as TLC, there are additional unmet needs. Additional funding to expand existing programs and to initiate new ones should come from county, regional, and state sources. FOCUS provides an opportunity for a new partnership between communities with priority development areas and county, regional and state agencies through the direction of resources to those communities seeking to create vibrant transit-served neighborhoods.

Notably, Bay Area communities have indicated needing support to develop parking policies around transit stations. Through its parking case studies, MTC recently released a parking toolbox that offers best practices and strategies to support transit-oriented development. Although there is no one-size fits all approach for parking policies, communities with future rail investments should evaluate

current their parking policies or develop new ones based on MTC's parking toolbox and other best practices.

5. *Create a One-Stop Shop for Technical Assistance*

Given the complexity and cost of creating comprehensive land use plans, one outcome of FOCUS might be the development of a one-stop shop, hosted by one of the regional agencies, that provides technical assistance to help cities, transit agencies and other stakeholders prepare station area plans and implement transit-oriented development. Technical assistance may include infill analysis and strategies; development code assistance; photo-simulations and visualizations; web-based visual preference surveys; and economic development strategies. The one-stop shop could prove valuable in the short-term given increasing interest in developing station area plans.

6. *Encourage Local Municipalities to Adopt Supportive Station Area Policies*

Delivery of rail services takes place over an extended period of time. This plan identifies future stations and connectivity points which would be served by rail. With this information in hand, Bay Area communities should develop station area policies that take advantage of these future rail investments. Having such policies in place would help to foster transit supportive land-uses and prohibit other uses that would undercut and underutilize the transit investment. Further, it would help to identify economic strategies and financing schemes that capture the economic benefits from housing and commercial development in station areas.

9.2 Governance Strategy

Overview

Governance refers to the entity(ies) which assumes responsibility for planning, design, funding, construction, and/or maintenance and operations of passenger rail. As new elements of the regional passenger rail system develop over the next few decades, there could be increasing conflicts between the needs of passenger rail and freight trains. Generally speaking, the freight railroads would want to divest themselves of all dispatching responsibilities where passenger trains exceed 79 miles per hour. As rail expansion opportunities are pursued, such entity(ies) could provide a venue for negotiations between public and private interests for operating and dispatching rights, acquisition of access, and/or outright purchase of rights-of-way or portions of right-of-way from private freight rail lines and other rights-of-way required from private entities for rail/highway grade separations.

At the present time, there are a multiple transit operators in the Bay Area and Northern California. Not only are there numerous local transit operators, some of which also provide light rail service within local jurisdictions, but there are also multiple providers of regional rail and rail transit services with overlapping geographies.

New services identified in MTC Resolution 3434 will result in development of additional rail corridors involving additional jurisdictions and added complexity due to additional geographic overlaps. For these reasons, and as required by the enabling legislation authorizing and funding conditions for this Regional Rail Plan, the governance strategy was

considered with respect to modifications which would support implementation of the Regional Rail Plan.

This analysis did not delve into the topic in great detail; neither did it include in-depth nor independent management or peer reviews of the issues. What was accomplished was a literature review of alternative governance models from a national perspective, resulting in the identification of some alternatives with potential applicability to delivery of regional rail services in Northern California. Two workshops with general managers and elected representatives from Bay Area rail providers were also held to consider the issues and models as well as potential risks and benefits.

Existing Bay Area Regional Rail Operators

The Bay Area has four providers of regional passenger rail services. Each are described briefly below:

Caltrain

Regional rail commuter service is provided between Gilroy and San Francisco by the Peninsula Corridor Joint Powers Board (JPB), with representation from three members: City and County of San Francisco, San Mateo Transit District, and Santa Clara Valley Transit Authority. There is a nine-member board with three appointed representatives from each of the members. Formed in 1987, the JPB took over the responsibility for the service from the State of California (Caltrans Division of Rail) in 1992. The JPB owns 46 miles of right of way from San Francisco to Tamien and has trackage rights south to Gilroy, and contracts with Amtrak for operating personnel. Day-to-day management and staff support is provided by the San Mateo County Transit District (Samtrans).

BART

The San Francisco Bay Area Regional Transit District was created by the Legislature in 1957, when it was expected that five Bay Area counties would be joining the effort to build the first new regional rail system. Eventually, the counties of Marin and San Mateo opted out of the district, leaving San Francisco, Alameda, and Contra Costa Counties (service is currently operated in San Mateo County under a purchase of service agreement between BART and Samtrans.) The agency is guided by nine elected board members representing that same number of districts in the three-county service area.

Altamont Commuter Express (ACE)

This service was created in 1997 through a Joint Powers Agreement between the San Joaquin Regional Rail Commission (SJRRRC), Alameda County Congestion Management Agency and the Santa Clara Valley Transit Authority. Policy and day-to-day management are provided by the SJRRRC. The board has eight regular members and two additional special voting members from BART and Alameda County. There are also ex officio members representing Caltrans District 10, San Joaquin Regional Transit District, and San Joaquin Council of Governments.

Capitol Corridor

Originally managed by Caltrans and still considered part of California Amtrak, this 170 mile system provides rail service to eight northern California counties (Placer, Sacramento, Yolo, Solano, Contra Costa, Alameda, San Francisco, and Santa Clara). The governing structure is a joint powers agreement between six local transit agencies that serve the counties above. There is a 16-member board, with two representatives from each of the 8 counties. BART provides the policy and day-to-day management. Board appointments are made

through the member transit districts. The current governance structure was put into place in 2003.

Governance Models

A literature review was conducted to identify various governance structures and enabling and/or means used to form them from various large metropolitan areas around the United States with some consideration for European models. From this research, four distinctively different models were identified that would have potential applicability to Northern California (see Table 9.2-1):

- **Decentralized** – Characterized by multiple service providers with separate governance structures, as represented by the status quo in Northern California
- **Regional Federation** – A loose form of association under an umbrella organization responsible for implementation of joint initiatives. Services are delivered within the region of the federation by separate operating entities each having separate staffs and reporting to separate boards.

The Regional Transit Authority (RTA) in Chicago exemplifies a federation style governance model. RTA is responsible for planning and budgeting of regional services in the Chicago area. Beneath the RTA are three service providers each with separate boards responsible for construction, maintenance and operations: the Chicago Transit Authority (CTA) which provides bus and rail services within the City of Chicago; Pace, which operates all of the suburban bus services consolidated under one entity, and Metra, which is the regional rail provider.

Within California, The San Diego Association of Governments (SANDAG) provides a slightly different approach to the federation model with SANDAG serving as lead agency for funding, planning, design and construction with separate operating companies as subsidiaries to provide maintenance and operations. The SANDAG consolidation was enabled by passage of state law SB 1703 in 2003.

- **Regional Rail Authority** – This model illustrates the functional consolidation of all regional passenger rail services. All passenger rail services are unified under a single governance structure responsible for all aspects of rail ranging from planning and design to maintenance and operations. Regional rail authorities may or may not have direct funding authority granted to them. A regional rail authority can either be formed as a new district or provided by association as a joint powers authority. One example of this is the Southern California Regional Rail Authority (SCRRA), which performs planning, design, construction, management and operations for the Metrolink system. For the purpose of this discussion, the term “Regional Rail Authority” is meant to pertain to a single operator for the regional passenger rail mode rather than a particular vehicle of formation. For example, the SCRRA JPA includes the counties of Los Angeles, Ventura, Orange, Riverside and San Bernardino.
- **Consolidated Regional Rail** – Fully consolidated operations are provided in a number of East Coast cities including Boston, New York, Philadelphia and Washington DC (metro rail and bus only). Consolidated authorities may have broad power ranging from funding through maintenance and operations over multiple modes with large geographic areas.

For example, the New York Metropolitan Transit Authority is responsible for a comprehensive network of transit, commuter rail, and bridge and tunnel facilities in the greater metropolitan area. The MTA functions with a board of seventeen members nominated by the governor, with some recommended by the New York City mayor and county executives of suburban counties.

There are also six additional rotating non-voting members who represent organized labor and the citizens’ advisory committee. All board members must be confirmed by the New York State Senate. The service area covers Manhattan, Long Island, southeastern New York State, and the state of Connecticut, with an estimated population of 14.5 million. Subsidiaries include:

- New York City Transit - provides subway and bus service to Manhattan, Brooklyn, Queens, the Bronx and the Staten Island Railway
- Long Island Rail Road – commuter rail service from three hubs in New York City to eastern Long Island
- Long Island Bus – formed in 1973 through combination of ten private bus carriers and provides service to 96 communities, 47 LIRR stations, and five subway stations in Nassau, western Suffolk and eastern Queens counties
- Metro-North Railroad – consolidation of several private commuter railroads with service out of Grand Central Terminal northward to suburban New York and Connecticut
- Bridges and Tunnels – system of five bridges and two tunnels in New York City serving more than a million people daily; surplus toll revenues help subsidize mass transit

Table 9.2-1: Governance Models

	Decentralized	Regional Rail Federation	Regional Rail Authority	Consolidated Regional Rail
Summary Description	<ul style="list-style-type: none"> Multiple providers with separate boards JPA's for inter-jurisdictional operations Some coordination of services and joint initiatives on ad hoc basis supported by MOU's 	<ul style="list-style-type: none"> One regional authority for funding and planning Separate operating entities with own boards for design and construction as well as maintenance and operations 	<ul style="list-style-type: none"> Single provider with one board for "mega-region" Responsible for planning, design, construction as well as maintenance and operations 	<ul style="list-style-type: none"> One "mega-regional" board of control with funding, planning, engineering and construction as well as maintenance and operations consolidated
Examples	Bay Area Status Quo	Chicago RTA SANDAG	SCRRA (Metrolink) Sound Transit (Seattle)	New York, Boston, Philadelphia, Washington DC
Pros	<ul style="list-style-type: none"> No changes to existing entities required 	<ul style="list-style-type: none"> Easier to establish than regional rail authority or full consolidation Could provide an incremental path for change 	<ul style="list-style-type: none"> Provides high level of benefit with minimal organizational coordination once established 	<ul style="list-style-type: none"> Grants maximum control and power to effect across-the-board initiatives
Cons	<ul style="list-style-type: none"> Does not provide any provisions for attaining desired outcomes except through ad hoc actions 	<ul style="list-style-type: none"> Significant internal dialogue required to effectuate major across-the-board efforts 	<ul style="list-style-type: none"> Potential for friction between regional rail network and local modes 	<ul style="list-style-type: none"> Perception that local interests may not be served

Benefits/Risks

The following potential benefits and risks were identified with respect to moving toward a more centralized form of regional rail governance:

Potential Benefits

- Schedule Coordination
- Centralized Operations
- Uniform Fare Structure and Collection
- Railroad Negotiations
- Procurement Economies of Scale
- Improved Customer Service
- Streamlined Administration

Potential Risks

- Reduced Local Accountability and/or Autonomy, perceived or real
- Potential for Higher Labor Costs
- Potential for Work Stoppages

Workshops

Two workshops were held with general managers and board members representing Bay Area providers of regional passenger rail. At the workshops, the various issues, models, risks and benefits were discussed, along with identification of potential venues which would result in more unified delivery of services.

In looking at the most important benefits and risks from the list above, participants placed highest weight on “Improved

Customer Service” as the most important benefit, closely followed by “Schedule Coordination”. Of the risks, the highest rated concern was “Potential for Higher Labor Costs.” There was a consistent viewpoint that the customer is the most important element to consider when managing and delivering rail services regardless of the governance structure in place. However, it was noted that consolidation per se may not necessarily result in improved customer service – in other words, a poorly run but highly consolidated entity may not deliver as good performance to the customer on the street as a less consolidated network of well managed providers. Although the participants’ concern was primarily with delivery of rail services (as opposed to tackling the issues of local bus transit consolidation) it was noted that regional services of any nature such as regional bus lines should be considered in the event a new regional entity were to be formed.

Next Steps

Consensus emerging out of the partner workshops is that:

- A single or consolidated authority carries higher degree potential risks
- Existing regional coordination efforts are consistent with the evolution of a federation model
- Additional steps toward a federation model include, but not necessarily limited to, strategies listed in Table 9.2-2

Table 9.2-2 identifies various initiatives including present coordinated efforts and potential nearer and longer-term joint governance initiatives that could be considered. These questions ultimately are policy issues for resolution by MTC and affected rail operators.

Table 9.2-2: Joint Governance Initiatives

Activity	Current Efforts (Status Quo Governance)	Federation Approach (Near Term Continuum Efforts)	Transition (Mid/Long Term Federation or Authority)
Fare Collection/ Structure	<ul style="list-style-type: none"> • Universal ticketing (TransLink®) • Integrated Fares (RM2-funded study underway) 	<ul style="list-style-type: none"> • Existing regional rail operator appointed lead agency to deploy and administer TransLink® 	<ul style="list-style-type: none"> • Regional rail federation develops uniform fare guidelines; operators implement through MOU's
Schedule Coordination & Wayfinding	<ul style="list-style-type: none"> • SB 1474 – periodic review of coordination issues • Consolidated traveler information (511.org) • Integrated Wayfinding Signing (Transit Connectivity Plan) 	<ul style="list-style-type: none"> • Standing schedule coordination committee established to review schedules on-going basis • Transit consortium sponsors initiative to expand dissemination of traveler information • Transit consortium sponsors initiative to develop uniform wayfinding standards • Transit consortium to oversee implementation and operation of a consolidated regional call center. 	<ul style="list-style-type: none"> • Regional scheduling committee provided with authority to mandate specified schedule coordination • Standards developed to define traveler information availability regionally • Uniform wayfinding standards implemented
Centralized Operations/ Train Dispatching	<ul style="list-style-type: none"> • Mostly being handled by railroads – Caltrain the exception 	<ul style="list-style-type: none"> • New center established to dispatch East Bay services operating over Altamont in the event the Oakland Subdivision is purchased 	<ul style="list-style-type: none"> • Capitol Corridor develops joint dispatching with UPRR responsible for management of shared corridor • Caltrain/High-Speed Rail dispatch center established to manage separate passenger-only segments

Activity	Current Efforts (Status Quo Governance)	Federation Approach (Near Term Continuum Efforts)	Transition (Mid/Long Term Federation or Authority)
Railroad Right-of-Way Negotiations	<ul style="list-style-type: none"> Currently being handled independently among agencies 	<ul style="list-style-type: none"> Execute MOUs between key operators to designate one entity to negotiate right-of-way purchases on behalf of all regional rail entities 	<ul style="list-style-type: none"> Regional rail consortium with appointed lead agency to negotiate right-of-way purchases; could prioritize Bay Area right-of-way preservation needs
Regional Procurement	<ul style="list-style-type: none"> Some joint purchase of large dollar-value procurements (e.g., rail cars) Design and construction activities mostly independent 	<ul style="list-style-type: none"> Formalize joint procurements; standards identified and adopted for vehicles, systems and guideway components 	<ul style="list-style-type: none"> Federation or Authority sponsors initiatives to define standards for joint procurements and for acquisitions pursuant to same
New Services	<ul style="list-style-type: none"> Resolution 3434 rail project implementation 	<ul style="list-style-type: none"> New rail service(s) to be managed and operated by existing operator; no new rail operators within region 	<ul style="list-style-type: none"> Potential to consolidate operations of services in overlapping jurisdictions

Findings and Recommendations

1. MTC and Bay Area rail operators have engaged in a series of initiatives to improve the customer experience of rail transit as an integrated system – e.g., trip planning, customer information and fare collection – these initiatives should be fully deployed and the customer experience further integrated through coordinated joint efforts involving the operators under the direction of MTC.
2. The Bay Area is increasingly engaged both from the perspective of economic, demographic and travel factors with adjoining Northern California areas especially with respect to the Northern San Joaquin Valley to the East but also including counties to the South and North.
3. From the Regional Rail planning process it has become apparent that there is no single existing entity in greater Northern California which spans the geographic scale of the emerging “megaregion”.
4. A greater integration of project development, planning and initiatives aimed at further integrating and enhancing the customer experience could be gained by formalizing relationships between planning, funding, construction as well as maintenance and operations of rail services through a “federation” of Northern California entities.
5. In the longer term, a new federation could, with new funding and a mandate to implement regional rail solutions. These would include efforts such as addressing right-of-way needs, access to private freight lines, and dispatch of public sector or joint corridors.
6. To this end, it is recommended that near term steps be undertaken to formalize a rail federation.
7. As such in the near term no new rail operators should be “chartered” or established which would provide new services that are interconnected with the regional network.

9.3 Funding Strategy

The Regional Rail Plan is a blueprint for future rail expansion in the Bay Area. Its intentions are twofold:

- 1) to create a long-term Bay Area vision and advocacy document for a world-class regional rail system; and
- 2) to inform the next generation of rail improvements beyond current MTC policy and funding commitments.

All elements of the plan – from right-of-way preservation to core capacity enhancements to system expansion – are considered in a financially unconstrained environment in order to identify the most important near-, mid- and long-term regional rail improvements without being burdened by a financial straight-jacket.

Funding rail expansion projects is no small task – particularly since the price tag for rail projects tends to be in the multi-millions to billions of dollars. The estimated total capital investment for this plan is about \$43 billion in 2006 dollars. Capital costs were determined for each corridor based on infrastructure, vehicle and right-of-way requirements, and order of magnitude operational costs are currently under development. Capital costs for Alternative 1, which emphasizes investment in a significantly expanded BART system as the regional provider, is estimated at \$40 billion. Alternative 2, which places the focus on the development on new electrified passenger lines regionally which are separated from freight, has a \$37 billion capital cost. Overall, finding public and private revenues to fund capital construction is a sizeable challenge, which the region has tackled successfully in the past. However, the much bigger challenge is securing additional revenues to pay for operating costs. This is why

complementary land-use strategies are so important to maximize ridership and minimize the need for additional operating subsidies.

Forging regional consensus behind a program of projects for purposes of advocating for and pursuing federal, state and regional funding has proven to be a critical first step in delivering high-priority rail expansions. Adopted in 1988, MTC's Resolution 1876 was the first consensus agreement in the region to champion high-priority rail expansions, including the BART extension to the San Francisco International Airport, new BART service to Dublin and Bay Point in the East Bay, and the Tasman light-rail extension in Silicon Valley. Resolution 1876 leveraged almost \$2 billion in state, regional, and local funds to obtain commitments for \$930 million in fiercely competitive federal New Starts funds for the Bay Area.

As part of the 2001 Regional Transportation Plan (RTP), MTC developed and ultimately adopted the successor consensus agreement for regional transit expansion – Resolution 3434. Resolution 3434 is a roughly \$13.5 billion program of rail, regional express bus, and ferry enhancements and expansions. The financial plan for Resolution 3434 is comprised of an array of federal, state and local sources and matched funds to projects based on project competitiveness and eligibility. MTC is currently developing a Resolution 3434 Strategic Plan, scheduled for release in 2008, to provide a financial framework for successful program and project delivery.

Funding for Regional Rail Plan investments beyond current Resolution 3434 commitments will likely come from multiple sources, as follows:

- **Federal:** Federal transportation funds from various programs benefit rail service and station development. Recently completed and current projects in the Bay Area that have received substantial federal funding include San Francisco's 3rd Street Light-Rail Extension and Santa Clara County's BART Extension to San Jose. Federal funding categories include New Starts, Small Starts/Very Small Starts, and other Federal Transit Administration funding categories. Most of these funding sources are dependent on annual appropriations from the federal government, though some programs are multi-year.
- **State:** State bonds have been a key funding source for rail and transit projects. Past bonds include the 1990 Passenger Rail and Clean Air Bond Act (Proposition 108), which generated \$1 billion in funding, and the Clean Air and Transportation Improvement Act (Proposition 116), which provided close to \$2 billion in one-time source of funding for rail and transit projects. Funding from both bonds are largely spent or dedicated to specific projects.

More recently, in 2006, California voters passed Proposition 1B, which provided roughly \$20 billion for transportation purposes statewide; that amount includes \$2 billion for freight-related infrastructure improvements (including rail freight) and another \$1.3 billion for Bay Area transit improvements.

In 2008, California voters are slated to decide on a High-Speed Rail Bond that will provide a substantial down payment towards the implementation of state-of-the-art

high-speed rail system connecting the Bay Area to southern California. Other matching state and federal funding sources, as well as the CHSRA's broad contracting powers to secure private sector funds, will be pursued to fully implement the envisioned high-speed rail system.

- **Regional:** Regional funding has been an important contributor to the funding and delivery of numerous transportation projects in the Bay Area. In 1988, Bay Area voters approved Regional Measure 1 (RM1), which authorized a standard auto toll of \$1 for all seven state-owned Bay Area toll bridges. The additional revenues generated by the toll increase were identified for use for certain highway and bridge improvements, public transit rail extensions, and other projects that reduce congestion in the bridge corridors. In 2004, voters passed Regional Measure 2 (RM2), raising the bridge toll by \$1.00. This extra dollar is to fund various transportation projects within the region that have been determined to reduce congestion or to make improvements to travel in the toll bridge corridors, including rail improvements and expansions.

Regional Measures 1 and 2 toll bridge funds are fully committed to projects and programs identified in their respective expenditure plans. Any potential surplus of toll revenues generated would be directed toward the regional bridge seismic program. Per the Streets and Highways Section 3091(h), the MTC/Bay Area Toll Authority shall, by January 1, 2020, submit a 20-year toll bridge expenditure plan for RM2 to the Legislature for adoption. Further, this expenditure plan shall have, as its highest priority, replacement of transit vehicles. When the expenditure plan is developed, there may be potential

opportunities to advocate for toll bridge funding for rail expansion projects identified in this Regional Rail Plan. Additionally, as the Regional Rail Plan includes numerous high-cost water crossings, tolls could be raised to provide funding capacity to address these needs.

- **Local:** Local transportation sales tax measures have been the bulwark of the Bay Area's transportation funding over the past two decades. To date, seven of the nine Bay Area counties have successfully enacted voter-approved transportation sales tax initiatives. Notably, Resolution 3434 identifies over \$5 billion in local sales tax funding for rail expansion and improvement projects. Current regional rail projects like the East Contra Costa and Alameda/Santa Clara counties BART extensions and the Caltrain Downtown Extension are being funded in part through local sales tax measures. Future local sales tax funds, developer fees and private capital may be available for rail projects.
- **Public/Private Partnerships:** Private investment, mainly from the rail freight operators (Union Pacific and Burlington Northern Santa Fe, will be an important funding source to implement the railroad-based improvements recommended in this plan. The rail freight operators own most of the rail rights-of-way in the region and allow rail passenger use for a fee. The private railroads have and will continue to be funding partners to improve freight and passenger rail service to implement improvements that are mutually beneficial to both. As an example, the \$2 billion in Proposition 1B funding for freight infrastructure improvements requires up to a 50 percent match; the private railroads have indicated their interest in participating financially with local entities to

secure some of this funding for local rail freight improvements.

Public Private Partnerships (P3) are another way to leverage public monies. A good example of a P3 is the Oakland Airport Connector project. Since public funding for this project was not sufficient to cover capital costs of constructing the project, BART, in an effort to move this project forward will be seeking private investors, using a design-build-operate, best value contract award approach.

- **Creative Financing:** New revenue streams may be available in the future. Two examples of potentially emerging opportunities include:
 - **Congestion Pricing** – Pricing of access to crowded major highway facilities could be used to implement rail improvements. This strategy could off-set some of the social equity issues associated with congestion pricing in that proceeds from a pricing strategy could be used to support basic transportation needs for those not able to afford priced highway options.
 - **Carbon Credits** – As initiatives are developed to fight global warming, participation in development of rail lines, especially those which would be electrified, or conversions to more energy-efficient lightweight equipment could be funded by private investors interested in receiving credits for reduction of pollutants and greenhouse gases.

Upon its adoption in September 2007, this Regional Rail Plan will be an important input into MTC's long-range regional transportation planning effort. Transportation 2035, which is

currently under development and slated for adoption in early 2009, will represent the transportation policy and action statement of MTC for how to approach the region's transportation needs over the next 25 years. It will propose a set of transportation investments that can be implemented with available funding as part of the financially constrained element of the plan as well as identify programs/projects in the vision element if new funding becomes available. Transportation 2035 may afford opportunities for including other regional rail expansion projects in its longer-term vision element.

9.4 Corridor Preservation Strategy

To develop regional rail improvements, lands along the proposed regional rail improvement corridor/routes should be preserved for future rail corridor expansion and development. Other land development should be prevented in such a way that the future rail line or improvements are not compromised. If outright purchase of the corridor is not available or feasible at this time, advanced planning for preservation of the corridor can be a cost-effective, environmentally responsible, and efficient activity that can reduce the overall future cost of the project(s) to the taxpayers.

Examples of corridors of interest identified in the plan include:

- North Bay branch lines connecting between proposed SMART service and Capitol Corridor at Cordelia (Northwest Pacific west of Schellerville; UPRR east of Schellerville)
- Oakland Subdivision (Oakland – Niles for Dumbarton Service and Niles – Lathrop/Stockton for ACE)
- Lands paralleling UPRR main lines in Central Valley (identified as an alternative by ACE and California High Speed Rail Authority)

Goals include:

- Preserve land for important continuous rail facilities needed to support future rail services demand.
- Minimize taxpayer cost over the long-term by avoiding costly right-of-way acquisition of future developed property.
- Support an integrated approach to land use and transportation planning.
- Provide options for corridor acquisition or preservation that can easily integrate the future design, operation, and maintenance needs of a regional rail system.
- Seek consensus on a preferred rail system plan by all affected communities and agencies through supporting adoption of consistent local comprehensive plans, zoning, and subdivision regulations.

Current Ownership

There are generally two types of “corridors” that help define differences in acquisition or preservation strategies. These are:

- Land or corridors in private ownership – Preserving lands or rail corridors in private ownership presents real business and negotiation challenges. Whereas the publicly-owned lands will often require an open and deliberative public involvement process, arrangements with some private land holders can be made fairly rapidly and in a straightforward manner. Private property holders are more likely to consider a relatively straightforward

business-oriented cost-benefit analysis approach. Only one set of public review and approval processes are needed on behalf of the Regional Rail entity.

- Land or corridors in public ownership – Protecting or preserving lands in public ownership within which the future rail corridor improvements would be located requires a deliberative public process. Implementation of the Regional Rail improvements will require public decision on distinct segments and related protection or preservation actions, often involving agreements between and with multiple jurisdictions. These jurisdictions generally must engage in their own public discussions and process regarding the protection, sale, or transfer of lands to a Regional Rail entity.

The Corridor Preservation Process

Regional Rail corridor improvements will be located in varying terrain and across publicly- and privately-owned lands and facilities with different intensities of existing land use.

Different combinations of these variables, in concert with dynamic real estate markets, can make the preservation of land areas along the corridor challenging. While some areas may be simply acquired, other sections along the corridor may need multiple strategies to ensure preservation.

Consideration must be given to both interim protection and long-term preservation actions. Strategies are not all equally effective in preservation efforts, nor do they represent equal costs or risk. Short term measures can help to hold land out of development until purchase can be made or title is otherwise transferred. These generally require minimum cash outlay, although they should be considered a prelude to

ultimate acquisition. Longer-term preservation measures definitively ensure that the rail rights-of-way are or will be available when needed. These are best used when planning and environmental reviews have reached the stage for delineating right-of-way lines with some precision, and/or when key parcels are under threat of imminent development.

Some potential short term strategies include:

- **Conservation or other special easements (also known as Official Maps of Reservation)** – Acquisition of some interest in land less than fee simple or other right in order to preserve the property in a static condition.
- **Option to purchase at a later date** – Grants an entity the right to purchase the rental property during the term of the lease.
- **General Plan Corridor designations** – Functional classification for a “Regional Transportation Corridor” where Regional Rail is anticipated.
- **Corridor Protection Zoning Overlay District** – Impose special development regulations on areas which have been already designated in the General Plan as future “Regional Transportation Corridors”.
- **Density transfer within a single property** – Cluster development to protect the needed right-of-way.
- **Right-of-way platting** – Subdivision map reserves areas for public use, including easements.

Potential long term preservation strategies include:

- **Fee Simple acquisition** – Property or easements are purchased outright for just compensation.
- **Land Banking** – Acquisition of land in advance of expanding urbanization.
- **Public/Private Partnerships** – Property exchange, lease back, or special financing (tax exemptions, bonds) in return for land donations.
- **Transferable Development Rights** – Landowners are allocated development credits which can be sold. In return, the landowner agrees to a permanent conservation easement.
- **Development Easement Acquisition** – Establish a specific limited use right, such as the right to place rail lines across the property.

Key Implementation Steps

The key to implementation is to have a governing entity with sufficient geographic scope and authority to move ahead with specific right-of-way acquisition or preservation actions (refer to Section 9.2, Governance). Some of the considerations for the activities of a governing unit established to address right-of-way preservation and acquisition include:

1. Develop a database for each corridor for intra-agency use, including information on land ownership, General Plan, Specific Plan, and zoning designations, present

development activities, and private development plan approvals.

2. Determine the specific preservation actions necessary at different times (due to development pressure) and locations along each corridor.
3. Develop an overall corridor preservation plan for the region.
4. Establish a process to review preservation opportunities when active rail corridors are proposed for abandonment.
5. Develop funding program that includes annual allocations to implement the acquisition program identified in the preservation plan, plus a process where funding can be quickly obtained when unexpected opportunities arise to purchase properties or rights.

10.0 IMPLEMENTATION

Implementation of the Regional Rail Plan will require a comprehensive approach. Attached to this Executive Summary is a possible phasing for the plan. The following key considerations pertain to plan implementation:

- **Phasing** – The Regional Rail Plan report identifies a possible phased implementation plan which addresses near term (Year 2015) medium term (Year 2015 – 2030) and long term (post Year 2030 to Year 2050 and beyond) timeframes
- **Funding** – Assembly of nearly \$50-billion present-day dollars for development of the Northern California regional rail network, including Resolution 3434 commitments and BART reinvestment, will require significant new sources of funds; funding is a top priority concern
- **Governance / Rights-of-Way Arrangements** – The Regional Rail planning process considered governance and right-of-way issues which need to be addressed to fund, obtain rights-of-way, build, maintain and operate the regional rail network. Opportunities for joint programs or for new initiatives, which could be undertaken in the near term under a federation of existing operators, were identified and may be pursued further as part of potential new legislation. In the longer term, a regional rail federation could provide an umbrella under which negotiations with freight rail operators for acquisition of rights-of-way and operating rights could proceed.
- **Land Use Policies** – Existing policies developed separately by BART, MTC and other entities governing station area developments could be unified and broadened to pertain to the Northern California “mega-region” to assure that the highest densities are developed along rail corridors and around stations/major connectivity points, thereby establishing the ridership markets and providing convenient access to the regional rail network.
- **Integration with Other Planning Efforts** – This Regional Rail Plan only focused on a single transportation mode – rail. Therefore, this plan will ultimately need to be integrated with other regional planning efforts such as the Regional High-Occupancy Toll (HOT) Network Study, regional express bus plans, Water Transit Authority’s Ferry Operations & Implementation Plan, MTC’s Freeway Performance Initiative, and other regional and local planning efforts. The synergy between this Regional Rail Plan and other regional and local plans would underscore the importance of looking at and planning regional transportation from a multi-model perspective.

11.0 NEXT STEPS

Projects advanced under the Regional Rail Plan would be implemented in accordance with existing project planning, funding and project development procedures.

The following specific follow-on efforts are recommended:

- **Evaluation Measures** – MTC adopted rail system expansion and improvement criteria during the development of its Resolution 3434 transit expansion program, and is currently developing a Resolution 3434 Strategic Plan to provide a framework for successful program and project delivery. This Regional Rail Plan helps inform the next generation of rail expansion beyond Resolution 3434.
- **Travel Market and Ridership Analysis** – Detailed ridership studies to evaluate corridor service options.
- **Land Use Analysis** – Sensitivity testing should be performed for Regional Rail projects to reflect on-going refinements to land use visioning, particularly more focused land use patterns.
- **Service Model** – Additional analysis and testing should be used to identify specific operating plans including routings and frequencies.
- **Cost Analysis** – Cost estimates prepared for the Regional Rail plan are planning-level, order-of-magnitude cost and will be refined to reflect the level of detail of the project description as projects are further developed.
- **Environmental Clearance & Community Impacts** – As rail projects and services are developed, full environmental review and public involvement will be provided to refine project specifics and identify mitigation measures.
- **BART Operations** – BART will be leading its own effort to address passenger needs including development of criteria for infill stations, how to best implement its 30-year capital plan and strategic vision, constructing higher frequency line segments, skip-stop services and other improvements considered in this plan.
- **High-Speed Rail** – The CHSRA has released a Draft Environmental Impact Report/Environment Impact Statement (EIR/EIS) for the Bay Area to Central Valley portion of a statewide high-speed rail system which provides information on high-speed rail options, costs, benefits and potential impacts. The CHSRA will be accepting comments through September 2007 on the draft environmental document to inform the decision making process regarding preferred high-speed rail alignments and station locations within the Bay Area to Central Valley study area. The Regional Rail process will provide input to the CHSRA as it prepares its final environmental document and decides on the preferred routing for high-speed rail between the Bay Area and Central Valley.